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Knowledge and the Public Mind. A Preliminary Study of the Distribution and Sources of Science, Health, and Public Affairs Knowledge in the American Public.

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The average individual often knows very little. He has a sketchy knowledge about most topics, and knowledge in depth only about a very few. The factors that condition what and how much he knows are myriad. Of importance are time, education, income, sex, age, race, occupation, and where a man lives. Controlled, education tends to nullify the other factors, although they may re-emerge as predictors of what, and how much, a man is likely to know. Status in life is a noteworthy medium. Thus income, occupation, age, and race count. So does sex: women know more about health, and men know more about science and public affairs. In public affairs, the best predictors of knowledge are education, exposure to television, and interest in political campaigns. In health, the best predictors are education, print, and sex. In science, they are education, status in life, and print. If controlled, education can be used to stimulate a desire to know. The conclusions result from re-analysis of data collated between 1940 and 1967, in 35 national surveys. (GO)

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KNOWLEDGE AND THE PUBLIC MIND

A Preliminary Study of the Distribution and Sources of Science, Health, and Public Affairs Knowledge in the American Public

by
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the cooperation and assistance of Philip
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Stanford, California: December, 1967

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Foreword

These secondary analyses of national sample surveys which provide the data for this book were undertaken originally in preparation for a major field study of public knowledge. Now that this study has been postponed for what may prove to be a considerable time, we are making the preliminary results available, in the belief that they themselves may be of interest.

We wish to acknowledge with gratitude the advice and assistance of our senior colleagues in the Institute for Communication Research, notably Dr. Paisley who has been chief consultant for the statistical analysis; Dr. Parker, whose joint study with Paisley of two communities contributed some of our data; Dr. Maccoby, Dr. Chu, and Dr. Rivers. We are especially indebted to Dr. Philip J. Tichenor of the University of Minnesota, whose doctoral dissertation on public knowledge of science and health, was one of the first major studies of public knowledge within the Institute at Stanford. Portions of his data have been incorporated into some of the following tables. In a sense, Dr. Tichenor might be considered, therefore, a joint author of this report, but he is blameless for the analysis of the public affairs data, a great deal of the re-analysis of the health and science data, and for the writing. We are deeply grateful to a number of individuals and

organizations who made research data available to us for reanalysis. Among these are Dr. Philip K. Hastings, of the Roper Library of Public Opinion, at Williams College; Drs. Peter Rossi, Paul Sheatsley, and Patrick Bova, of the National Opinion Research Center, at the University of Chicago; Drs. Warren Miller and Philip Converse, of the Survey Research Center, University of Michigan; Drs. Ralph Biscoe and Harold Dode, of the Inter-University Consortium for Political Research, University of Michigan; Mr. Richard Salant, of the Columbia Broadcasting System; and Dr. Herbert I. Abelson, of the Opinion Research Corporation. We acknowledge also the intelligent and skillful help of Mr. James George and Mr. Ray Funkhouser, with the computer work. And finally, we are grateful to Mrs. Linda N. Miller and Mrs. Jane Edwards, who were responsible for the great amount of typing the study required, including this report.

Serena Wade
Wilbur Schramm

Stanford, 20 November, 1967

I. PUBLIC KNOWLEDGE: THE EVIDENCE AND THE GENERAL PATTERN

Just over two-thirds of American adults could name the Vice President of the United States in 1952. In 1957, just over one-fifth could name their Congressman, one-third could name one or more of their Senators. In 1954, only about half knew the number of Senators allotted to each state. In 1955, 76 per cent of American adults knew the name of the man who had invented the telephone, but only 7 per cent knew the name of the planet nearest the sun. Only 11 per cent knew the difference between a vitamin and a calorie, in 1941, but in 1955, 68 per cent could name one or more symptoms of cancer.

These are examples of the kind of evidence available on the level of public knowledge of public affairs, science, and health in the United States. Now, what exactly do they mean?

The Evidence

First, what kind of evidence are we citing?

Such figures, and many others we shall cite in later pages, come from national sample surveys. These consist of interviews with a very large sample (usually 1000 to 2500) of individuals chosen so as to represent the entire population of American adults. There is always the possibility of sampling error, of course, but for the most part the surveys are carefully conducted and reported so that it is possible to calculate an estimate of their probable accuracy. That is, it is possible to calculate that the chances are 95 in 100 that the results obtained from the sample are within, say, one or two per cent of the results that would be obtained by interviewing the entire population of the country. In general, we can be reasonably confident that the figures quoted from the surveys are reliable predictors of what a population census would show -- not in the sense that tide tables or tables of atomic weights are reliable predictors, nor in the sense that a small difference between two of the obtained results is necessarily a true difference; but they are likely to be dependable enough to tell us a great deal about what American adults knew at the time the question was asked.

Most of these surveys have been incompletely analyzed. It was unnecessary at first to extract every bit of significance, because the great majority of surveys were intended to contribute to news rather than to science. The percentage of people who could name the Vice President is sufficient to make a news story. To make the story a little better, it might be desirable to determine also how many Republicans and how many Democrats could name him, or possibly how many men and how many women. But there is still a great deal of evidence in a survey that is of interest to someone who wants to know the state of public knowledge in more detail than the news columns care to report it. For example, how does the ability to name the Vice President relate to a person's education and his use of mass media? Is it any less among older than among younger people? How does knowledge of the Vice President's name relate to a person's ability to answer other questions in a survey -- for example, what the electoral college does, or how many Senators each state has? If a person knows one such fact about public affairs is he likely to know others, and if he knows more than most people about public affairs, is he also likely to know more than the average person about science? And how are above-average or below-average holdings of knowledge distributed in the population, geographically, by social group, by education, by age, and otherwise?

Therefore, it is possible, if data have been preserved, to re-examine and re-analyze surveys where pertinent questions have been asked, so as to get more out of them than was needed when the study was first made. Fortunately, a few libraries of survey data now exist, among them the Roper Library of Public Opinion at Williams College, and the Inter-University Consortium for Political Research at the University of Michigan. Both of these have been kind in permitting us to use their material. Certain other organizations, notably the National Opinion Research Center at the University of Chicago, the Survey Research Center at the University of Michigan, the Opinion Research Corporation, and the Columbia Broadcasting System (which has put surveys of science and public affairs on television) have also been most cooperative in sharing their data.

Within these separate sources we have found 54 national sample surveys that appear to be useful in estimating public knowledge of science, health, and public affairs. These extend from Gallup Polls in the early 1940's to the televised CBS science survey in 1967. On 35 of these we have performed secondary analysis -- that is, gone back to some of the original data, read them into computers, and determined relationships not figured when the research was originally analyzed. Among these 35 are three important surveys aimed at studying public knowledge intensively in a single substantive area: two by the Survey Research Center (on science, 1957, and on public affairs, 1964), and one (on health, 1958) by the National Opinion Research Center. We shall treat these at some length in a later chapter. Altogether we have found about 300 survey questions in the areas of public affairs, science, and health that seem to us important enough to record and re-examine. Some of these have been repeated in different years. They provide the basis for most of what we can say about how much people know.

How Much Do People Know?

We can look at this question either from the standpoint of the public or that of the individual. That is, we could try to find out how widely a given person's knowledge extends among a large number of topics, or how widely the knowledge of a few topics is distributed among a large number of people. Most of our evidence allows us only to do the second of these: to make statistical statements about average levels of knowledge in the population or some part of it.

We have made a few very intensive interviews with individuals to get some sense of the dimensions of their knowledge in these three areas. These reinforce the conclusion that our active storage systems contain a great deal of superficial information on a wide variety of topics, and intensive information on relatively few. That is, we have "heard of" a great many persons and things. We are vaguely familiar with them. We have assigned many of them a value tag -- good, bad, or indifferent. We tend to group these topics together into useful headings, related either to the shape of current events as we perceive them, or to our own particular needs.* On a few topics we have gone beyond the level of superficial knowledge, stored away a great many systematically associated facts, and in some cases have arrived at really sophisticated understandings of process and are prepared to draw implications. These areas of deeper and fuller knowledge reflect, as Tichenor has shown, our "life space," the patterns of our experience, in school, in primary groups, and in our roles and responsibilities.

Some of us, better educated or more widely experienced, have developed more of these areas than others have. Any one of us is likely to have certain well-developed areas of knowledge related to his own needs and concerns. For example, a diabetic may know very little about science in general, but after taking care of himself for a few years will probably have a great deal of information about diabetes, and this will spill over to a certain extent into his knowledge of disease and the functioning of the human body in general. A fisherman may not understand diabetes or constitutional law very thoroughly, but he will have certain knowledge about the sea and its inhabitants and the processes of extracting food from the sea that even an oceanographer may not have. A scientist may command a great many facts about a particular aspect of nature or living creatures, but if he is a good scientist he will also know a process which will enable him to derive information about many other aspects of the world around him.

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*Donald Coombs, of Stanford, has been studying these matters. His results will be available at a later time.

And any of us, at a given time, is likely to have a considerable body of facts about things that dominate the news. For example, we are likely to know more about Vietnam than we did ten years ago. There is good reason to believe that what we read in the papers about President Eisenhower's heart attack in his first term as President spilled over into our general knowledge of heart disease and of the workings of the coronary and arterial system.

Thus, the general picture of an individual's stored knowledge is something like this: (a) he knows a very little about a great many things and more about a few things, and has really deep and sophisticated knowledge of only a very few areas indeed; (b) the better-developed areas depend on his life experience, especially his education and the self-education that has continued after school, on his individual needs and concerns, and on what appears in the mass media; and (c) he classifies his knowledge into convenient headings. We are not likely to be able to go much beyond that with the data at hand; more intensive individual interviews of the type required to illuminate individual differences at this level would be highly informative, but are not likely to occur in national surveys.

We can, however, say something in the statistical sense of public, rather than individual knowledge. Public knowledge has at least four dimensions: X numbers of topics in A areas are known in Y depth by Z proportion of the population. Sampling lets us estimate Z. For X and A, however, we are dependent upon the questions that surveyors ask, and these are very far from representing a universe of knowledge. Therefore, anything we can say about the extent of knowledge within areas and among topics must be very sketchy indeed. We can deal only with examples, rather than samples, of topics and areas. That leaves us with the problem of estimating Y.

A very high proportion of polling questions are designed to be answered yes or no, or with a name or a brief statement: Have you heard of a vaccine for polio? Who invented the telephone? How many Senators has each state? Briefly, what is "fallout"?

This kind of question tells us who has information at that level, but does not tell us who knows more than has been asked for about the topic, or how much less any respondent knows. Therefore, we are getting only one point on a curve of knowledge which must be considerably different among individuals. A physicist will probably know vastly more about fallout than will a nonscientist, even though both of them can answer the question as stated above. Both a political scientist and a layman may be able to name their Congressman, but the political scientist will probably know vastly more about what the Congressman actually does. And a Congressman might know more than either of them.

Suppose we were to construct a naive scale of public information. (Present knowledge may not entitle us to construct anything more than that.) Our scale might look like this:

1. No information -- never heard of it
2. Heard of it, but no specific information

3. through 5. (let us say). Increasing amounts of specific information

6. Sufficient information and understanding to describe a process or define a concept.

For example, Grandmother may never have heard of the St. Louis Cardinals. Mother may have heard of them, but have no specific information. Daughter knows they are a major league baseball team. Father can name some of the players and tell where the Cardinals stand in the league. Son, who is quite a student of baseball, can do all these things and also discuss the organization of baseball, the rules of the game, and the strategies involved.

Now, if a survey asked, "Have you ever heard of the St. Louis Cardinals?", the results would lump together all the family except Grandmother; they can all answer yes to the question as asked. If the question is, "Who or what are the St. Louis Cardinals?" then we still include everyone except Grandmother and Mother. If we ask "Can you name any member of the St. Louis Cardinals?" we eliminate everyone except Father and Son, although it must be clear that Father knows more than the question indicates, and Son knows still more than Father. This is the problem that we typically face in handling survey data, for very few questions seek out different levels of knowledge on the same topic.

A few questions do so. For example, in 1962, 82 per cent of a sample had heard of Medicare, but fewer than 10 per cent could correctly explain the conditions for coverage. In 1957, 76 per cent knew there was a vaccine to protect against Asian flu, but only 35 per cent could name even one symptom of the disease. In 1947, 80 per cent could say in general what a Presidential veto is, but only 70 per cent of those knew that Congress could override the veto, and only 44 per cent of those who knew about the override were aware of the majority required to accomplish it. In 1950, almost 20 times as many people had heard of Truman's Point Four Program as could remember any of its purposes.

In 1957,

- only 7 per cent of a very large sample of American adults had any technical information about radioactivity -- how it is produced, its effects on human beings, and the like.
- 21 per cent were able to talk of it in nontechnical terms, comparing it to radium, X-rays, and so forth;
- 25 per cent were able to make vague statements -- it's dangerous, it kills, it's like dust or fog from the bomb, and so forth;
- 11 per cent had heard of it, but knew no details;
- 2 per cent had heard of it, but mainly misinformation;
- 34 per cent had never heard of it.

Whenever such comparisons are possible between levels of information on the same question, the proportion of people who know the answer tends to decrease as the amount or sophistication of the required information increases.

The number of persons within survey samples who are completely ignorant of a topic give us little reason for complacency. For example, in 1957, 26 per cent of a national sample of adults had never heard of fluoridation. In the same year (before Sputnik) 54 per cent had never heard of space satellites. In 1954, at the height of Joseph McCarthy's career, 30 per cent of the people were still unable to connect the Senator with Congressional investigations of communism. In 1964, 20 per cent of a national sample said they had never heard of the John Birch Society, the Black Muslims, or the American Communist Party. In 1952, less than 50 per cent could name both the Republican and Democratic candidates for Vice President. And in both 1952 and 1954, 81 per cent of a national sample could not name all three branches of government, and 78 per cent could not correctly identify the Bill of Rights.

On any question intended to measure public knowledge of science, health, and public affairs, there is almost certain to be a sizable number of persons unable to answer. Sometimes these numbers are large, sometimes small. As we shall see in later chapters, the proportions of know-nothings on given questions are likely to be much greater among certain segments of the population than among others. There are also considerable differences even among questions that seem to require about the same level of knowledge in the same general topical area. For example, it can be seen in the listing of questions in the Appendix that when people were asked to identify five scientists or inventors, the number of correct identifications of Gutenberg and Freud was under 25 per cent, of Oppenheimer between 25 and 50, of Einstein between 50 and 75, and of Alexander Graham Bell between 75 and 100. In 1957, 93 per cent of respondents could identify John L. Lewis, but only 35 per cent could name one of their Congressmen. In 1964, 90 per cent knew Johnson's home state, 80 per cent knew Goldwater's. In 1960, over 90 per cent knew Kennedy's religion, but only 73 per cent knew that Nixon was in his 40's. All this means is that variables other than the hierarchy of knowledge are at work something other than the quality of their accomplishment or the nature of the information asked for, made Bell better known than Gutenberg, Oppenheimer better known than Freud.

Can we say anything about the level of knowledge in one of these areas as compared to others? Unfortunately, we can say little with confidence. We have no way of knowing whether a question about science is truly comparable to a question about public affairs or health. We have tried to assemble some suggestive data by taking five questions in each of the fields where it was possible to distinguish the answers by levels of information, and in each case to record the proportions of people who proved to be truly knowledgeable on the question. For example, a 1960 study of political affairs asked respondents to name the Cabinet officers who must be appointed by a newly elected President. We recorded the percentage who could name more than half of these Cabinet positions, and considered that to be able to do so could be called "high" information. The same general tactic was followed with the other questions, and then a weighted mean was calculated for each of the three fields. The results were as follows:

	High information
Public Affairs	32%
Health	18
Science	14

This table has a certain face validity, but very little scientific validity. It is reasonable to expect that people would have more specific information on public affairs than on either science or health, because, after all, the mass media make available a great deal more on public affairs than on either of the other areas. They might be expected to have more specific knowledge about health, which is important and personal to them, than about science, which is remote to most of them. But these comparisons must be regarded as suggestive, not definitive.

The kind of evidence available, as we have said, leads us toward an understanding of variables and relationships in public knowledge, rather than to an estimate of the level of public knowledge in any absolute sense. At the end of this monograph the reader will find a number of knowledge questions asked in different years, with the percentage of correct answers obtained from each. This is one way to answer the question, how much do people know (or did know when the questions were asked) about science, health, and public affairs. In more general terms we can say with some confidence that on almost any given topic in these fields, a certain proportion of the public will have no information whatsoever, and the more information the question requires, the more sophisticated the type of information asked for, the fewer people who are likely to be able to answer it -- other things being equal. But other things are seldom equal, and that is why it becomes important to try to identify the other variables that enter into the pattern of building public knowledge.

WHAT KINDS OF KNOWLEDGE QUESTIONS CAN PEOPLE ANSWER?

PROPORTIONS OF CORRECT RESPONSES TO SAMPLE QUESTIONS ON PUBLIC AFFAIRS, SCIENCE AND HEALTH, DIVIDED BY QUARTILE (For more complete list, with full statement of questions, see the APPENDIX to this volume)

0-25%	26-50%	51-75%	76-100%
Can you explain the difference between a vitamin and a calorie? (AIPO, 1941) 11%	Will you tell me who the chief delegate to the U.N. is from the U.S.S.R.? (AIPO, 1947) 34%	Can any possible harm result from drinking milk that is not pasteurized (raw milk)? (AIPO, 1944) 64% [Yes]	Look over this list of names and tell me who each one is or what he does. (AIPO, 1947) MacArthur 97%
What is your understanding of what the Wagner Labor Act provides -- or is supposed to do? (AIPO, 1947) 19%	Do you happen to know of any medicine that is made from the organs or tissue of animals? (NORC, 1948) 33%	From what you have heard or read, what do you think is the main purpose for the atom bomb tests which are to be held in the Pacific? (AIPO, 1946) 69% ["see what it will do]	Here are some photographs of important men. Will you please look at the photographs and tell me their names? (AIPO, 1948) Truman 93%
Who was Gutenberg? (AIPO, 1952) 23%	What does the expression "welfare state" mean or refer to, as you understand it? (AIPO, 1949) 36%	Will you tell me what the term "cold war" means? (AIPO, 1951) 55%	Will you tell me what the initials F.B.I. stand for? (AIPO, 1949) 78%
Will you tell me what the three branches of the government are called? (AIPO, 1952) 19%	Will you tell me where the Suez Canal is? (AIPO, 1952) 48%	What mineral or metal is important in the making of the atom bomb? (AIPO, 1952) 60%	For how many years is a President of the United States elected -- that is, how many years are there in one term of office? (AIPO, 1952) 93%
Will you tell me the name of the new Secretary-General of the United Nations? (Hammarskjold) (AIPO, 1953) 10%	U-235 was the name of a famous German submarine during World War II. Would you say that's true or false? 37% [false]	Will you tell me who is the Vice-President of the United States? (Barkley) 69%	

CONTINUED.....

0-25%	26-50%	51-75%	76-100%
Just in your own words, what is the purpose of the Bricker Amendment? (AIPO, 1954) 13%	Do you know of any uses of atomic energy except for war purposes? (AIPO, 1956) 49%	Of what country is New Delhi the capital? (AIPO, 1955) 55%	Have you heard of three diseases (multiple sclerosis, muscular dystrophy, cerebral palsy)? (BASR, 1954) 81%
Which planet is nearest the sun? (AIPO, 1955) 7%	Do you think it is possible or not possible to catch POLIO from someone else? (NORC, 1955) 62% [possible]	Do you think cancer is contagious (catching)? (AIPO, 1950) 70% [No]	Who invented the telephone? (AIPO, 1955) 76%
From what you've heard, what is the purpose of launching space satellites? (SRC, 1957) 21%	Ever hear of pills called tranquilizers? (AIPO, 1957) 48%	Is pyorrhea curable? (NORC, 1959) 71% [Yes]	Do you know if there is a vaccine to protect against Asian flu or not? (AIPO, 1957) 76% [Yes]
Just in your own words, what is your understanding of the Kennedy administration's plan to increase trade with other nations? (AIPO, 1962) 13%	Compared with the earth, about how big would you say the moon is -- much larger? about the same size? or much smaller? (Minnesota, 1957) 38% [smaller]	Do you happen to know which party had the most Congressmen in Washington before the election this (or last) month? (SRC, 1960) 59%	What doctor discovered the anti-polio vaccine? (AIPO, 1955) 80% [Salk]
Who would be covered by the Medicare plan proposed by the Kennedy administration? (AIPO, 1962) 10%	Please tell me who Nehru is. (AIPO, 1957) 43%	When you read or hear about "fall-out," what does this term mean to you? (AIPO, 1961) 57%	Do you happen to know what is Kennedy's religion? 90% [Catholic]
			Have you heard of the NAACP? (SRC, 1964) 88%

The Element of Time

We must remember that our survey information tells us only what a sample of the American adult population knew of a certain topic at a given time.

At a given time! It was in 1952 that 69 per cent of American adults could name the Vice President; we cannot say for sure that the same result would be obtained in 1953 or today. It was in 1957 that only 33 per cent could name one of their two Senators; we do not know whether this still holds. Public knowledge does not stand still. This is the difference between public survey data and some natural science data in which a reaction, once determined, can be expected to occur over and over again as often as the elements are brought together. How to handle the problem of time in estimating public knowledge is therefore a very difficult one. Ideally, we should like a very broad survey that would measure a number of facets of public knowledge at the same time, and it is to be hoped that such a study will be made within the next year or two; but even these data would be subject to question a few months after they are obtained.

There is still another bothersome time problem in public knowledge data. Most of the national sample surveys in this area have been designed to answer a question of the moment -- the impact of the Soviet launching of Sputnik, the familiarity of the public with candidates in a particular election at a particular point in the election campaign, the effect of a national campaign to raise the level of information on cancer, and so forth. In most of these studies there has been no intent to inquire broadly into the "state of public knowledge," and indeed the knowledge questions have typically been subsidiary to other purposes -- opinions, or voting intentions, or campaign effects. The questions have therefore in a great many cases been asked at a time when the level of information should have been at a peak. This is particularly true of the field of public affairs. Surveyors have gone into the field with questions that related to developments or decisions of wide current interest. Thus the effect of ongoing events has been magnified, and it is difficult to say to what extent the results are time-bound.

The problem of time is thus a troublesome one in this field. Not only are we sampling a population; we are sampling it at different points in time, some of them perhaps unrepresentative points, and therefore we must be extremely cautious in projecting the findings to the present.

What do we know about changes in public knowledge over time? Fortunately, a number of questions have been repeated on national sample surveys. One of these is the question about naming the Senators from one's own state. Here are the percentages of respondents in different years who could name at least one of their Senators:

1945	35%
1954	31%
1957	35%

How many Senators is each state entitled to elect? This also was asked in different years:

1945	55%
1952	64%
1954	49%

What in general does the electoral college do? This was asked five times during the decade of the 1950's, with the following proportions of people able to give answers that were "basically correct":

1950	34%
1951	35%
1954	36%
1955	35%
1960	33%

Here are the percentages of respondents able to define in recognizable terms a filibuster:

1947	48%
1949	54%
1950	48%

In two different years, these proportions were able to name at least one symptom of diabetes·

1955	48%
1958	50%

All these indicate rather stable levels of knowledge. A question of basic information (e.g., how the electoral college works) is likely to be more stable than one in which the tide of events boils up in the mass media and requires voters or buyers to make important decisions. For example, the vacillations in public affairs knowledge in 1951 and 1952 may reflect the heated political situations of those years.

But on the other hand there are many examples of survey results where the level of knowledge seems to have changed dramatically over the years. For example, public knowledge of satellites increased spectacularly after the launching of the first Russian Sputnik in 1957. In early 1957 only 20 per cent of the adult population had any information whatsoever about the purpose of such satellites, scientific or otherwise. In 1958, 27 per cent of the population knew the scientific purposes of a satellite and 37 per cent more could talk about the international and social implications of space satellites. Between 1955 and 1961, the proportion of persons able to explain the term "radioactive fallout" more than tripled --

1955	17%
1957	28%
1961	57%

Between 1948 and 1950, the percentage of respondents able correctly to describe the "Marshall Plan" increased from 52 to 75 per cent. All these changes can be ascribed to important news events or periods of public concern. Others can be related to continuing public campaigns. For example, over 15 years surveys revealed a most encouraging increase in percentage of adults able to name one or more symptoms of cancer:

1940	38%
1945	44%
1950	54%
1953	54%
1955	68%

Another notable increase in public knowledge can be related both to campaigns and to public events -- in this case, the discovery of the Salk vaccine. These percentages of adults knew that polio was contagious:

1945	49%
1955	62%

It is apparent that the parade of news in the mass media, the existence of massive campaigns of public information, and the widespread need to make decisions (as in election campaigns), all contribute to the areas of public concern and interest, and consequently to fluctuations in levels of public knowledge. Underneath these is a base of public knowledge probably derived from school rather than current news and events (for example, ability to name the planet nearest the sun, and knowledge of how the electoral college works) which may be expected to rise only with rising average levels of education. We shall not discuss these relationships at length now, because they will constitute a major part of the remaining chapters of this book. But they illustrate both the limitations and the advantages of the time-bound data with which we are compelled to deal. We cannot say with any great confidence precisely how much the public knows at this moment on any particular topic, unless we have just measured it. But we can say what the general level of knowledge in a given area is likely to be. And more important: We can derive from data like these certain important relationships. What kinds of people are likely to have what kinds of knowledge about a given kind of topic? How is a person's knowledge likely to be related to the education he has had or to his use of the current information sources? In other words, how is knowledge of a given kind likely to be distributed through the adult public, and, so far as we can tell, why?

EXAMPLES OF TIME SAMPLE QUESTIONS

Question and Source		Percent with correct answer
Do you happen to know the names of the two U.S. Senators from this state? (AIPO, 1945)		35
Do you happen to know the names of the two U.S. Senators from this state? What are they? (AIPO, 1951)	correct on at least one	53
Can you recall the names of your Senators? (AIPO, 1954)		31
Can you name the Senators from this State? (AIPO, 1957)		35
How many Senators are there from each state? (AIPO, 1952)		64
How many U.S. Senators are there from your state? (AIPO, 1954)		49
Will you tell me what the term "cold war" means? (AIPO, 1948		54
1950		58
1951)		55
Have you heard anything about the Taft-Hartley Act? (If YES) What do you think ought to be done about it? (SRC, 1948)		61 (Heard at least)
Have you heard anything about the Taft-Hartley Law? (SRC, 1952)		72
Would you tell me what is meant by the "fallout" of an H-bomb? (AIPO, 1955)		17
Have you ever heard of radioactive fallout or dust from an atomic bomb? (If YES) As you understand it, what is radioactivity like? (SRC, 1957)		65 (Heard at least)
When you read or hear about "fallout," what does this term mean to you? (AIPO, 1961)		57
Do you think it is possible or not possible to catch POLIO from someone else? (AIPO, 1945)		49
exact wording repeated (NORC, 1955)		62

Question and Source	Percent with correct answer
Can you tell me what the term "filibuster" in Congress means to you? (AIPO, 1947	48
1949)	54
Will you tell me what the term "filibuster" means to you? (AIPO, 1956)	48
Will you tell me what the three branches of the government are called? (AIPO, 1952)	19
What are the three branches of the Federal Government called? (AIPO, 1954)	19
Do you happen to know any of the signs or symptoms of diabetes? (NORC, 1955) One or)	48
What are the signs or symptoms of diabetes? more) (NORC, 1958)	50
What is your understanding of the purpose of the Marshall Plan? (AIPO, 1948)	52
Will you tell me offhand what the Marshall Plan is? (AIPO, 1950)	70 (2 measures 63 - 1 year)
Do you happen to know what a tariff is? What is it? (NORC, 1946)	46
What is meant by the term "tariff?" (AIPO, 1953)	63
Will you tell me what is meant by the term "electoral college' ? (AIPO, 1951)	47
What is meant by the electoral college? (AIPO, 1950	34
1951	35
1954	36
1955)	35
Will you tell me what is meant by the term "electoral college"? (AIPO, 1960)	33
What are the signs or symptoms of polio? (NORC, 1955	69
1958	71

Question and Source	Percent with correct answer
Have you heard anything about launching a space satellite, sometimes called a man-made moon? (If YES) From what you've heard, what is the purpose of launching these space satellites? (SRC, 1957 1958) Heard, with) some info.)	21 64
What do you know about the Bill of Rights? Do you know anything it says? (NORC, 1943 1945)	23 21
What are the first 10 amendments in the Constitution called? (AIPO, 1954)	33
Can you remember off-hand the name of the United States Congressman from your district? (AIPO, 1947)	38
Do you happen to know the name of the Congressman from your district? (AIPO, 1957)	22
Do you think cancer is contagious (catching)? (AIPO, 1950)	70
Do you think it is possible or not possible to catch CANCER from someone else? (NORC, 1955)	75
Can you identify the Franco regime? (AIPO, 1949)	58) 2 measures 56) - 1 year
With what country do you associate General Franco? (AIPO, 1950)	56

The Distribution of Knowledge

What determines the distribution of knowledge of science, health, and public affairs in the populace?

The pattern, as we see it emerging from these data, includes at least four elements. Two of these we have already talked about.

First, there are some characteristics of the knowledge itself. Knowledge is distributed through the public in a J-curve: vague, recognition knowledge is widely dispersed; more specific knowledge, and especially concept and process knowledge, is in short supply. Almost any knowledge question will draw a complete blank from a certain part of a sample. Beyond that, typically, a certain number will have heard of it but have little or no information, and still smaller numbers will know more and understand more deeply. Furthermore, there appear to be differences by subject matter. We do not know whether these are inherent in the difficulty or complexity of the material (e.g., whether science is less likely to be comprehended than some other subjects) or whether --as seems more likely -- the differences result from the kind of education we provide, the kind of subject matter that fills our mass media, and people's estimate of what kind of information is likely to be useful and pertinent to them. In any case, there is reason to think that public affairs, for example, is more widely known about and understood in some depth than is science.

Second, there is the parade of events, reflected chiefly in the content of the news media. The distribution of many kinds of knowledge seems to be timely. It is not at all surprising, when the media focus their attention so heavily on national political campaigns every four years, to find that at those times the public knows more about the political issues and the candidates; or to find that the outbreak of a crisis in Korea, Cuba, Vietnam, or the Middle East results in a rising curve of knowledge about those places and the political relationships and problems involved. But events also affect public knowledge of science and health. Certainly the shock of Russia's launching of the first orbital satellite had not only a political effect, but also an effect on what people knew of space and geography and orbital mechanics. President Eisenhower's heart attack, as we have suggested, not only had political significance, but also resulted in the public learning more about the causes and care of heart disease. It is also probable that the continuing use of the media for information campaigns results in rising levels of knowledge, as must have happened during the continuing campaign aimed at recognition and early detection of cancer symptoms. It is tempting, at this point, to speculate whether the relatively _unopposed_ campaign for early detection of cancer has resulted both in more learning and more behavioral result than the campaign against cigarette smoking, which has been opposed skillfully and resolutely in the media; but on this we do not have the necessary evidence to do more than speculate.

Third, there is the _perceived usefulness_ and pertinence of different kinds of knowledge to different publics at different times. We have little direct evidence on this, but intuitively it makes sense and it fits all the evidence we have. For example, the distribution of knowledge appears to accord with role differences. As we shall see in later chapters, women typically have more knowledge than men about health; and the care of family health is typically part of the mother's role. And in general the level of knowledge on comparable questions seems to agree well with our estimate of psychological distance of the subject matter from its potential users. For example, the fact that more people seem to have detailed knowledge about public affairs than about science would seem to reflect the likelihood of their being able to use that information in voting or making up their minds on pertinent questions. This is not to say that some developments within science will not ultimately affect the lives of people as much as will a new tax bill or the election of a Congressman -- only that this pertinence or usefulness is not so well perceived.

If we arrange questions within each field in order of the proportion of correct answers, we get scales that roughly approximate our intuitive estimate of perceived psychological distance or usefulness. For example:

Public Affairs	% with correct response
What is John F. Kennedy's religion? (1960)	90
Difference in political party platforms (1952)	71
Which party had majority in Congress? (1964)	64
What is a filibuster? (1956)	48
Purposes of Truman's Point-Four program (1950)	5

Science	% with correct response
Who invented the telephone? (1955)	76
What is "fall-out"? (1961)	57
What is the approximate size of the moon? (1957)	38
Who was Freud? (1952)	21
What is the planet nearest the sun? (1955)	7

Health	
Have you heard of a polio vaccine? (1957)	93
Name one or more symptoms of cancer. (1955)	68
Have you heard of tranquillizers? (1957)	48
Name one medicine produced from animals. (1948)	33
What is the difference between a vitamin and a calorie? (1941)	11

Let us hasten to admit that these results are confounded by the element of time (some were more timely than others when asked) and by differences in the level of knowledge (having merely heard of a polio vaccine is a distinctly lower level of comprehension than being able to explain the difference between a vitamin and a calorie). And yet in general the questions seem to follow a scale of apparent usefulness or closeness. Kennedy's religion was a key point in a voting decision that year. The Congressional majority was something people could do something about, whereas a filibuster was something to be handled by Congress in its fairly mysterious way, and the Point-Four program was remote and far from the power of most citizens to affect. The telephone is an application of science that must seem very close to most Americans, whereas the planet nearest the sun is both literally and figuratively distant, and not especially useful to know about. Radioactive fallout must be perceived by more Americans as immediately significant to them than is either the size of the moon or the identification of Sigmund Freud. Polio vaccine, with all the emotion generated about protecting children from the disease, must have seemed close and useful to more Americans than did tranquilizers. The early detection of cancer must have seemed more useful than knowing about the source of medicines. And so forth. We have little or no direct evidence as yet to link the perception of usefulness or psychological distance to these survey results, but it is difficult to doubt that such perceptions play an important part in the seeking and storing of knowledge.

Fourth, there are a number of characteristics of the people studied by these surveys that must enter into the distribution of knowledge among them. Their experiences and abilities, and in particular their education and information-seeking habits, are the chief kinds of characteristics we are thinking of. As we shall have ample occasion to note in later chapters, education is a powerful predictor of knowledge in these three fields. But education is only one of the experiences that go into forming an individual's life space. What is the relation of his education to his adult habits of seeking further information in the mass media? Mass media use must be an important factor in the distribution of knowledge; as a matter of fact, a large number of the survey questions deal with knowledge that must come from current sources rather than from school. What is the relation of a man's knowledge to his ability to pay for sources of knowledge (as reflected, for example, in his income), and to the norms of information-seeking in his occupation or his social group? When education, occupation, income, are held steady, is there any difference in knowledge attributable to age? When all these differences among other characteristics are held steady, is any part of knowledge explained by the geographical area in which one lives?

These are the questions on which our surveys provide the most evidence. Most of the following chapters will focus on such people-variables.

II. WHO KNOWS WHAT

Suppose that you are permitted to know only one demographic characteristic of a person you have never seen, from which to predict how much that person knows of public affairs, science, and culture. You are permitted, for example, to inquire about the person's age, sex, occupation, income, education, religion, race, or place of residence. What would you ask?

The evidence says that you would be well advised to ask how much education the individual has had. So powerful is education as an indicator of public knowledge that from it alone one can predict as much as from all the other demographic characteristics.

Considered by themselves, any of these characteristics will tell us something about how much people know. Knowledge goes up with education and income, and down with age (after the earlier adult years). It goes up when measured against an occupational scale from blue collar workers through white collar to managerial and professional jobs. About public affairs and science, men will usually have more knowledge than women; about health, women will know more. When the respondents in most national surveys are divided into whites and nonwhites, the whites usually have more knowledge, on the average, although it is hardly necessary to point out that they usually have more education, more income, and higher status jobs. There is some evidence, not entirely consistent, about differences relating to religious affiliation. We feel that the sample of nonwhite groups in most of these surveys is so small that the results may be unreliable, and we also have enough doubts about the samples by religion that we are not going to say much about either racial or religious predictors. We shall concentrate rather on education, income, occupation, sex, age, and place of residence.

Each of these characteristics, as we have said, by itself will give us some valuable information about public knowledge. But it is obvious that many of them are closely correlated with each other, and in fact an individual's education probably has more than anything else to do with the occupation he goes into and the income he earns. What happens, therefore, when the effect of education is eliminated -- that is, when high school graduates are compared with other high school graduates, and so forth? Here the results are somewhat different, for many of the other effects -- occupation, income, and so forth -- disappear. But not entirely. For example, the difference in knowledge by sex seems to be quite unrelated to educational levels. And among people of a certain educational level, occupation and income still relate to knowledge, independently of education. Therefore, in this chapter we are going to try to sort out some of these relationships and interrelationships of demographic characteristics to knowledge, first considering each of them alone, and then combining them in a three-way analysis with education controlled.

The Predictors Considered Individually

Public knowledge rises with education.

We are speaking, of course, of knowledge of science, health, and public affairs. We have little doubt that education is powerfully related to many other kinds of knowledge as well, but here our evidence is restricted to those three areas. And in these cases, the evidence for the statement just made is so powerful that it can hardly be doubted.

The typical pattern can be illustrated by the findings of a survey which, in 1960, asked a national sample to identify a list of nationally prominent political leaders. These were the percentages of people in each educational group who were able to identify more than half of the list:

Less than high school graduates	54%
High school graduates	71
Some college	86
College graduates	91

These differences are significant at the .001 level. Throughout the data we have examined, the differences by education are large and impressive.

We can add a great deal more evidence to the example just cited, not only in the field of public affairs, but also in science and health. Here, for instance, is a sampling of questions from a number of national surveys, with the answers divided by the educational level of the respondents. This table should be read as follows: In answer to a 1964 question on which political party had the most Congressmen in Washington before the 1964 election, 48 per cent of the persons with less than high school education could answer correctly, 56 per cent of the persons who had graduated from high school could answer correctly, and so forth.

These figures are impressively consistent. They can be supported by a variety of data, put together in a variety of different ways. For example, we examined 80 questions, all asked nationally, in terms of how many questions in the sample could be answered correctly by at least 50 per cent of the people in a given demographic group. Among people with less than high school education, almost exactly half the questions (39 out of 80) could not be answered by 50 per cent of the respondents. Among college-educated people, on the other hand, only 7 items out of 80 were not known by at least 50 per cent of the respondents. The proportion of people in the lowest educational group with no knowledge of these items was perhaps five and one half times the proportion in the highest educational group! Thus, there can be no doubt that the probability of giving a correct answer to a knowledge question increases with the education of the respondent.

In the figures quoted at the beginning of this section, concerning the ability to identify a list of national leaders, the reader noted perhaps that the greatest difference was between the people who had not gone so far as high school graduation, and those

PROPORTION OF PEOPLE WHO COULD ANSWER CERTAIN KNOWLEDGE QUESTIONS CORRECTLY -- BY EDUCATIONAL LEVEL (in percent)

	-HS	HS	HS+	COLL	TOTAL SAMPLE
Do you happen to know which party had the most Congressmen in Washington before the election this (or last) month? (SURVEY RESEARCH CENTER, 1964)	48	56	70	84	64
Have you heard of the Americans for Democratic action? (SRC, 1964)	24	37	50	76	42
Vice President Nixon . . . Do you happen to know what part of the country he comes from? (SRC, 1960)	33	68	74	85	54
When you hear or read about the term "bipartisan foreign policy," what does that mean to you? (AIPO, 1950)	17	35	56	82	33
Will you tell me what is meant when people refer to the 38th parallel in Korea? (AIPO, 1951)	62	82	91	95	73
Have you heard anything about launching a space satellite, sometimes called a man-made moon? (If YES) From what you've heard, what is the purpose of launching these space satellites? (SRC, 1957)	10	28	32	55	20
Do you know of any uses of atomic energy except for war purposes? (AIPO, 1956)	25	52	67	82	49

CONTINUED .....

	-HS	HS	HS+	COLL	TOTAL SAMPLE
Would you tell me what is meant by the "fallout" of an H-bomb? (AIPO, 1955)	08	16	26	36	16
What is the largest bird in the world? (AIPO, 1955)	21	28	36	40	26
What mineral, or metal, is important in the making of the atom bomb? (AIPO, 1952)	37	63	73	84	60
Have you heard about the Medicare Plan proposed by the Kennedy administration? (If YES) Who would be covered by this plan? (AIPO, 1962)	07	11	11	19	10
Have you heard about fluorides being added to drinking water? (If YES) What is the purpose? (SRC, 1957)	28	51	56	81	40
Ever hear of pills called tranquilizers? (AIPO, 1957)	25	50	64	78	48
Do you happen to know any of the signs or symptoms of cancer? (NORC, 1955) (Response is one or more symptoms)	42	71	77	83	62
Do you think it is possible or not possible to catch DIABETES from someone else? (NORC, 1955)	72	83	86	90	81

who had graduated from high school but had not gone to college. This is our general finding. For example, in the table just given, the average differences between the lowest education groups was about 18 per cent, between the second and third groups about 11 per cent, and between the third and fourth about 13. These are the averages:

Less than high school	30.6
High school graduates	48.7
Some college	57.9
College graduates	71.3

Thus, although more knowledge consistently goes with more education, there is some reason to think that the ability or opportunity to complete high school is a key step toward public knowledge.

There is also good reason to think that the more complex the question, the greater the effect of education. For example, answering the question on what part of the country Mr. Nixon came from, or naming one symptom of cancer, is a less complex task than explaining a bi-partisan foreign policy, the purpose of a satellite, or what is meant by "fall-out." As can be noted in the table, the differences between low and high educated groups are greater -- four or five times, as compared to two or three times -- in the more complex questions than in the simpler ones.

There is also at least a suggestion that educational differences show up most clearly in science questions and least clearly in public affairs questions. This is difficult to document, because any comparison of questions across subject areas tends to be suspect. Nevertheless, it seems to be a trend in the data. And if so, the explanation may be that the interests and understandings necessary to keep up with science depend more closely on what one learns in school, whereas public affairs knowledge is less dependent on school, and can be derived more easily than science knowledge from the mass media and the social environment.

Public knowledge rises with income and occupational status.

Here are figures from the same 1960 survey which asked for an identification of national political leaders:

Correct responses by income		By occupation	
Less than $3000	50%	Farm	47%
$3000-7499	69	Blue collar	57
$7500 and over	81	White collar	76
		Professional, managerial	85

These differences, like the ones relating to education, are significant at the .001 level.

Here are more data on differences in knowledge related to occupation and income:

PROPORTION OF PEOPLE WHO COULD ANSWER CERTAIN KNOWLEDGE QUESTIONS CORRECTLY -- BY OCCUPATION
(in percent)

	Professional - Managerial	Clerical, Sales	Manual, Service	Farm, Farm Labor	Housewives, Students, Retired	Total Sample
Name one or more powers now occupying Germany. (AIPO, 1950) (Response is all four only)	52	36	29	33	26	36
Have you heard what part of the country Senator Goldwater comes from? (SRC, 1964)	88	82	69	70	69	80
U-235 was the name of a famous German submarine during World War II. Would you say that's true or false? (Minnesota, 1954)	42	51	31	28	--	37
What great scientist who died recently do you associate with the theory of relativity? (AIPO, 1955)	86	79	56	41	60	63
Do you think it is possible or not possible to catch CANCER from someone else? (NORC, 1955)	86	82	71	65	77	75
Do you recall hearing anything about the vaccine for preventing polio? (If YES) What was it that you heard? (SRC, 1957) (Response includes specific information only)	60	46	34	25	39	40

PROPORTION OF PEOPLE WHO COULD ANSWER
CERTAIN KNOWLEDGE QUESTIONS CORRECTLY -- BY INCOME LEVEL
(in percent)

	LOW (under $3000)	MEDIUM	HIGH ($7500 or more)	TOTAL SAMPLE
Have you heard of the Black Muslims? (SRC, 1964)	61	71	87	71
Do you think pyorrhea can be cured? (NORC, 1959)	56	71	82	71
About how old would you say Nixon is? (SRC, 1960)	52	78	81	73
As far as you know, has the United States been sharing any of our information on atomic energy with England and Canada since the war? (NORC, 1949)	13	27	33	23
Just for fun, about how far from the earth would you guess the moon is? (Minnesota, 1957)	03	04	09	04

Without exception, a higher income and a position on the occupational scale closer to the highest paying white collar positions are associated with more knowledge in each of three subject areas we are examining. The greatest concentration of such knowledge is in respondents with a better than average income among the white collar and professional or managerial occupations.

Public knowledge tends to be inversely related to age.

Knowledge of public affairs, science, and health, is generally a little lower among people in the later years of life, as the table on the following page illustrates.

There is a suggestion of curvilinearity in these figures that is, a tendency for the middle age group to know more than either the younger or the older. This may reflect their experience with politics, with trying to keep a family healthy, and so forth. Why, then, does the level of knowledge fall off among people 60 and over? Do they forget, or become less interested? Either of these explanations may be true, but we must note that the average level of education has been rising sharply, and the oldest age group would, on the average, have the least education. The effect of age is therefore one of the matters we must look at very closely, in the following pages, when we present the multivariate analyses in which education is held constant. In any case, it should be noted that the differences by age group are less than in the case of some of the other characteristics.

PROPORTION OF PEOPLE WHO COULD ANSWER
CERTAIN KNOWLEDGE QUESTIONS CORRECTLY -- BY AGE
(in percent)

	21-39	40-59	60+	Total Sample
Will you tell me, offhand, what the Marshall Plan is? (AIPO, 1950)	69	72	66	70
Now take President Johnson [part of a series of questions of political leaders] Have you heard what part of the country he (President Johnson) comes from? (SRC, 1964)	86	89	82	84
Do you happen to know of any medicine that is made from the organs or tissue of animals? What? (NORC, 1948)	34	38	22	33
Compared with the earth, about how big would you say the moon is -- much larger? about the same size? or much smaller? (Minnesota, 1957)	41	40	28	38
Now here are some questions which may be used on a radio quiz program. Some of them are easy, but most of them are hard. I think you'll find them all interesting. Who was Gutenberg? (AIPO, 1952)	24	25	20	23
Can you explain the difference between a vitamin and a calorie? (AIPO, 1941)	12	09	08	11

Other things being equal, public knowledge of health will be higher among women; knowledge of science and public affairs, higher among men.

This is another remarkably consistent finding that goes throughout the data on public knowledge. For example, this sampling of questions:

PROPORTION OF PEOPLE WHO COULD ANSWER
CERTAIN KNOWLEDGE QUESTIONS CORRECTLY -- BY SEX
(in percent)

	M	F	Total Sample
Have you heard of three diseases (multiple sclerosis, muscular dystrophy, cerebral palsy)? (BASR, 1954)	79	82	81
Do you happen to know any of the symptoms of Asian flu? (AIPO, 1957) (Response one or more symptoms)	27	43	35
Do you happen to know what pyorrhea is? (NORC, 1959)	79	82	80
What are the signs or symptoms of polio? (NORC, 1958) (Response one or more symptoms)	60	77	69
Will you tell me who Marshall Tito is? (AIPO, 1951)	57	35	45
Suppose a young person, just turned 21, asked you what the Republican Party stands for today -- what would you tell him? (AIPO, 1951)	45	32	38
Which planet is nearest the sun? (AIPO, 1955)	10	05	07
Have you heard of the American Communist Party? (SRC, 1964)	78	71	76

The most likely explanation here is that it is typically the woman's role in the American family to be concerned and informed about health, and the man's role to be informed about public affairs. Furthermore, men are rather expected to be interested in science, and larger numbers of men than of women take science courses in school. We shall see in the following pages that this difference appears to be independent of education.

There is some evidence that public knowledge of these three subject areas may be lower in the South than in the other main regions of the country.

Here is a sample of the kind of results that appear throughout the knowledge data:

PERCENT WITH THE CORRECT ANSWER TO SELECTED
KNOWLEDGE QUESTIONS BY REGION
(in percent)

	E	C	S	W	Total Sample
Would you guess that more people are in hospitals for physical or mental illness (BASR, 1954)	52	54	56	46	53
Can you identify Einstein? (AIPO, 1945)	61	60	34	69	55
Will you tell me where Formosa is? (AIPO, 1951)	57	55	35	59	50
Do you happen to know what Kennedy's religion is? (SRC, 1960)	95	93	86	90	90

Knowledge by Region (Continued)

	E	C	S	W	Total Sample
As far as you know, is the U.S. trying to get other countries to agree to the international control of atomic energy, or not? (NORC, 1947)	55	54	56	64	56
Can any possible harm result from drinking milk that is not pasteurized (raw milk)? (AIPO, 1944)	62	67	56	66	64

In four of these six questions, the Southern region had the lowest percentage of correct responses. This is about the size of the trend throughout the data. It is hard to believe that such differences are not in large part reflections of educational level, and therefore we must look at regional differences in the light of the three-way analyses which follow.

Results of the Three-Way Analyses, with Education Controlled

How were the results different when education was held constant by comparing people in the same educational groups? That is, people who had not completed high school were compared only with other people who had not completed high school. This takes out the effect of education, and lets us determine how effectively the other variables can predict public knowledge without the help of education.

Differences in public knowledge, by sex, are independent of education.

The first thing to note is that the knowledge differences by sex persisted even when education was held constant. Here is a summary table on responses to nine questions asked by the CBS science survey in 1967 and the NORC survey of health information in 1958:

PROPORTION OF CORRECT ANSWERS
ON TWO STUDIES OF SCIENCE AND HEALTH
-- BY EDUCATION AND SEX

	CBS Science Study		NORC Health Study	
	M	F	M	F
Less than high school	61%	49%	26%	49%
Completed high school	82	62	50	73
More than high school	83	69	74	86
Total sample	72	56	49	70

Thus, regardless of education, men knew more than women about science. The same result was obtained on questions about public affairs, whereas on questions about health -- again, regardless of educational level -- women were more likely than men to know the answers. We can conclude, therefore, that there is a relationship between sex and public knowledge, over and beyond the effect of education.

Regional differences are much attenuated when education is controlled.

When education was held constant, on the other hand, the differences by region either disappeared or became very difficult to interpret. Here is a table with questions from the CBS science survey and the NORC health study, prepared in the same way as the one just cited:

PROPORTION OF CORRECT ANSWERS ON TWO SURVEYS OF
SCIENCE AND HEALTH, RESPECTIVELY -- BY
REGION, WITH EDUCATION CONTROLLED
(In per cent)

Science

	NE	NC	S	W
Less than high school	55	55	47	67
High school graduate	57	81	77	76
More than high school	80	73	77	79

Health

	NE	NC	S	W
Less than high school	32	29	36	64
High school graduate	61	73	64	50
More than high school	78	74	87	50

Overall, it is difficult to interpret these tables in terms of region alone. On the lowest educational stratum, the Southern region shows up least well in the science survey, but on the high school level, the Southern respondents did significantly better than the respondents from the Northeast, and there was very little difference among any of the regions on the college level. In the health study, there was no evidence of any less knowledge in the South when education was controlled, and we have some difficulty interpreting the rather wild variation in correct responses from the West. Before we can say much about regional variation, therefore, it is necessary to study the subject in more detail. But it seems likely that the mere fact of being in one region rather than another is not an essential ingredient in determining the differences in public knowledge. Important differences might arise from the kind of schooling available in one region as compared with another, the occurrence of illiteracy or near-illiteracy, the incentives in a given community to seek more information, the opportunities associated with race or average income or something of that kind. But hardly from the accident of being at one point on the map of the United States, rather than another.

When education is controlled, differences in public knowledge related to occupation, income, and age occur chiefly in the lower educational group.

When we examined the relationship of income, occupation, and age to knowledge, with education held constant, we obtained some interesting results. The following table was prepared by

THE RELATIONSHIP OF AGE, OCCUPATION, AND INCOME TO KNOWLEDGE, WITH EDUCATION CONTROLLED

Knowledge Question		Education			Source
		Less than H.S.	H.S.	More than H.S.	
Foreign aid	Occ	**	-	-	SRC 1956
	Age	-	-	-	
	Inc	+	-	-	
Civil rights	Occ	-	-	-	SRC 1956
	Age	-	-	-	
	Inc	**	-	-	
International involvement	Occ	**	-	-	SRC 1956
	Age	-	-	-	
	Inc	***	-	-	
Post-election majority	OCC	***	-	-	SRC 1960
	Age	**	-	-	
	Inc	***	-	+	
National political leaders	Occ	***	-	-	Almond Verba 1960
	Age	-	-	-	
	Inc	***	+	-	
Presidential duties	Occ	***	-	+	Almond Verba 1960
	Age	-	-	-	
	Inc	**	-	-	
Farm price supports	Occ	***	+	+	AIPO 1953
	Age	*	-	-	
Filibuster	Occ	+	+	+	AIPO 1956
	Age	+	-	-	
Identify Senator	Occ	**	-	-	AIPO 1957
	Age	***	+	-	
Identify Congressman	Occ	***	+	-	AIPO 1957
	Age	***	+	-	
Electoral College	Occ	+	-	-	AIPO 1960
	Age	+	+	-	
Medicare	Occ	-	-	-	AIPO 1962
	Age	-	-	-	

$+\ p < .10$

$*\ p < .05$

$**\ p < .01$

$***\ p < .001$

three-way analysis of a sampling of questions from eight national surveys of public affairs knowledge. We have not shown the percentages in the table, in order not to complicate the picture. Instead, we have recorded only the differences that were statistically significant. Three stars indicate a difference significant at the .001 level, two stars at the .01 level, one star at the lowest level of significance commonly accepted -- .05. Where the differences approached but did not quite reach acceptable significance (where they were greater than .05 but less than .10) we have indicated this fact by a plus sign, and where they were greater than .10 we have put a minus sign. In reading the table, therefore, one should look for the boxes where stars appear. These are the places where there is a significant difference, when the effect of education is eliminated, between knowledge and the variable indicated.

This same finding can be illustrated by some figures from the NORC survey of health information.

PROPORTION WHO COULD NAME MORE THAN ONE SYMPTOM
FOR EACH OF THREE DISEASES -- BY AGE AND
INCOME, WITH EDUCATION CONTROLLED
(In per cent)

	Income			Age				
	Under $3000	$3000-6999	$7000 or more	20-29	30-39	40-49	50-59	6[illegible]
Less than high school	26	30	21	33	54	42	27	3[illegible]
High school graduate	49	56	66	53	65	71	63	63
More than high school	80	80	79	80	79	88	70	5[illegible]

This pattern is clear and consistent: When education is held constant, significant relationships between knowledge and income, occupation, and age appear only in the lowest educational groups. There are few significant relationships among people who have graduated from high school or gone to college.

What does this mean? Later in the book, when we present more sophisticated analyses, we can perhaps illuminate it more clearly. But this evidence suggests an interaction between education and post-school experience. When people have had at least high school education, they have apparently picked up interests and skills that lead them to continue seeking information and enable them to understand it. For persons of this kind, occupation, income, and age make relatively little difference; it is rather the amount of education that makes the difference. But people who have not gone through high school may not have acquired the interest and skills, the tools of learning, to enable them to go on learning of their own accord. They are thus powerfully affected by the kind of job they work in -- the opportunity and incentive it gives them to continue seeking information -- and their income, which limits the amount of information they can afford to bring into their homes.

The relationship of knowledge to age appears to be a bit more complicated. We have noted a curvilinearity in the pattern of knowledge by age that is, the people in middle life know more than either the younger or the older ones. For example, here is another table from the CBS science survey:

PROPORTION OF PEOPLE WHO GAVE CORRECT ANSWERS TO MORE THAN HALF OF NINE SELECTED QUESTIONS -- BY EDUCATION AND AGE
(In per cent)

	Age 21-39	40-59	60 and over
Less than high school	51%	66%	46%
Completed high school	67	76	73
More than high school	74	84	63
Total sample	60	72	53

Beside this we can put a table compiled from seven questions, in other surveys, on public affairs, health, and science. This table separates the poor answers from the excellent ones -- the persons who could give seven or more details in answer to a question, and those who could give three or less.

PROPORTION OF PEOPLE WHO COULD GIVE VERY FULL ANSWERS AND THOSE WHO COULD GIVE FEW OR NO DETAILS, ON SEVEN SELECTED QUESTIONS -- BY EDUCATION AND AGE

	Less than high school			Completed high school			More than high sch.		
	20-39	40-59	60,over	20-39	40-59	60,over	20-39	40-59	60,over
Seven or more	13%	16%	14%	25%	34%	27%	42%	36%	25%
Three or less	35	43	60	22	20	13	13	15	12

It is evident, from this table, that the chief age differences relating to knowledge of public affairs, science, and health, are between people who have finished high school and those who have not, and the chief difference between the high school and college people which can be related to age is due to the young, college-educated people.

On that basis, let us tentatively suggest a few generalizations about age as related to public knowledge:

1. Among people who have gone beyond high school, the younger ones tend to know more about public affairs, science, and health, and to be able to give more sophisticated answers. This may perhaps be attributed to the recency of their schooling, and the more nearly current education they have had.

2. Among people who have completed high school, but not gone further, experience plays a larger role, and therefore the people over 40 tend to have more knowledge than either the younger or the older groups.

3. Among people who have not gone as far as high school graduation, there is likely to be a decline in information with advancing age. This may perhaps be attributable to their not having acquired the necessary skills or interests for seeking further information.

4. However, all three of these conclusions must be qualified by a consideration of the psychological distance or usefulness of the information asked about. For example, the young people tend to know more about polio and satellites; the older, more about diabetes.

The Importance of High Knowledge

At this point it will be interesting to look at the following table, which has been prepared in such a way as to separate out the percentages of persons who gave minimum information from those who gave a substantial amount of information in response to six questions from selected surveys.

Now, what do these findings mean?

On the surface, the interpretation is clear enough. The trends we have been describing are not generally noticeable among those who gave minimum answers to the questions. It is among the respondents who gave maximum answers to the questions that we find the relationships which seem to pertain between public knowledge and demographic characteristics -- knowledge rising with educational level, women knowing more than men about health, young adults knowing more than old people, and so forth.

For the deeper meaning of this finding, we have no very confident interpretation at hand. It would seem that in *every* demographic group there must be a number of people who have very little knowledge of a given subject or area. The differences between groups seem to depend on the relative few who have acquired a *considerable* amount of information about a given topic, and these tend to be much more numerous in the higher educational groups, among women in the case of knowledge about health, and so forth. In thinking about public knowledge, therefore, we shall be mistaken if we think of it as being evenly distributed *within* demographic groups. In *any* group there is likely to be a large segment who do not know, and probably do not feel the need to know, much about any given topic

PROPORTION OF RESPONDENTS HAVING MINIMUM OR MAXIMUM
CODABLE INFORMATION FOR SIX KNOWLEDGE ITEMS --
BY SEX, AGE, AND EDUCATION
(In per cent)

				Age			Education				Sex	
				20-39	40-59	60+	-HS	HS	HS+	COLL	M	F
Pres. cabinet members (A-V)	PUBLIC AFFAIRS	MIN	1-4	40	36	37	38	43	40	16	16	20
		MAX	5+	36	36	26	18	41	56	79	19	14
National political leaders (A-V)		MIN	1-3	17	18	20	23	18	07	07	14	21
		MAX	4-6	67	66	60	54	71	86	91	71	60
Satellite info. (SRC 1957)	SCIENCE	MIN	vague	14	13	16	14	16	13	10	13	15
		MAX	yes, info.	24	19	12	10	28	32	55	31	12
Fallout (SRC 1957)		MIN	vague	37	37	34	35	43	38	22	36	37
		MAX	yes, info.	32	27	18	14	37	47	69	37	21
Cancer symp. (NORC, 1955)	HEALTH	MIN	only one	19	19	20	18	20	--	19	21	18
		MAX	four or more	09	11	07	03	10	--	14	05	11
Polio symptoms (NORC, 1955)		MIN	only one	12	12	14	13	12	--	12	15	10
		MAX	four or more	23	15	05	07	19	--	30	10	23

%s do not add to 100 because "don't know" and incorrect responses were omitted.

within these three areas; and the decreasing size of these groups with education or the other predictors is not sufficient to make us proud of our efforts with public information.

We can speculate, without any very conclusive evidence, that the figures on minimum knowledge, which show so little difference between demographic groups, may represent a kind of basic penetration of the mass media -- the result of a routine exposure to the flow of facts and ideas through the media without any special effort to seek out such information or think about the content. The topic is probably not psychologically very close or challenging. The higher figures, on the other hand, must represent some special initiative, some development of the life space in that subject area. It may thus be the absence or presence of special need, interest, or initiative that distinguishes some members of a demographic group from others and determines whether they will know much or little about something. Or it may reflect the media they use and the way they use them. Perhaps we can throw more light on this question in the following chapters.

What Do These Results Mean?

In the preceding chapter we enumerated several kinds of variables that seemed to enter into determining the levels of public knowledge -- the nature and complexity of the knowledge itself, the parade of events through the mass media, the perceived usefulness or pertinence of a given kind of knowledge, and certain characteristics of people and their experience which seem to relate to seeking and storing information. In this chapter we have been dealing with these "people variables." We have been able to point out the great power of education as a predictor of public knowledge, and its fairly complicated relationship to the other characteristics studied.

It is well to distinguish among these variables by level. For instance, it is easy to see that region is merely a demographic characteristic that is easy to measure, not one that is likely to have any effect on knowledge. If public knowledge is lower in some cases in the South, it is probably because there is in that area a higher proportion of people with little education, because certain segments of the society have fewer cultural opportunities and perhaps less incentive to keep on learning, and so forth. The geography doesn't make the difference. Similarly, income probably has little basically to do with public knowledge, but it does make it easier for a family to buy books and magazines, take adult education courses, and the like, and thereby expose the members to more knowledge. On the other hand, education has a direct effect: A person in school is absorbing knowledge, and learning the ability and the incentive to absorb further knowledge when he leaves school. And social role is much more directly influential than, say, region, because our society casts all of us in certain basic roles despite education, despite occupation, despite region or income, and to fill these roles we must seek out and keep available certain kinds of relevant information.

Age is a fascinating variable to consider in this way, because it must have some direct influence -- for example, weakening vision and lessening energies restrict one's ability to seek information -- but influence must come through other determinants. As we have pointed out, an aged person today is likely to have had less education, and a type of education less currently relevant, than a young person today. Furthermore, when an individual comes to the age of retirement he no longer has the need to seek occupation-related information; he probably has a lower income and therefore less opportunity to buy information materials; and he may come to feel alienated from some of his old political and social interests, and therefore less in need of seeking informational experiences.

The pattern that seems to be emerging from these data is something like this: In our school years, we build skills and interests. This is the time when we chiefly enlarge and structure our life space, and throughout much of the rest of our lives we are engaged in filling in or slightly enlarging the structure for which we laid the foundations in school. This process of filling in the life space we might call, for want of a better term, informational experience. The kind of informational experience we have after the school years depends on a great many things, including the residue of our education. It depends on income, on occupation, on the culture we live in, and on the social roles we play. Social role we might consider as a third major determinant. It is one of the reflections of our culture, just as the nature of our educational system is a reflection of our culture, and it is an important one, as we have seen from the evidence on sex roles.

Education, later informational experience, and social roles, then, if we know enough about them, can probably explain a large part of the differences in average levels of public knowledge. It is easy to see why education is such an important predictor, because so much of later informational experience follows along from it. But in order to understand more about the relationship of education to later information-seeking, we need to consider the evidence on sources of public information which will be presented in the next chapter.

III. THE SOURCES OF PUBLIC KNOWLEDGE

Many channels supply public knowledge. People learn what they know about science, health, and public affairs from a multiplicity of sources; only in the most specialized areas of subject matter is it possible to think of a single source. We learn in school, and we learn from experience. We learn from the mass media and from other people. We learn from print and from the electronic media. All these sources, in their own ways, cover all the broad areas of our environment. Therefore, when we try to identify sources of public knowledge, it is necessary to talk not about which source is used, but rather about which source is more likely to be used, or which source is preferred. This is the approach we shall take in this chapter.

What kind of person is likely to seek information from one source rather than another? Is a person who adopts one of these information-seeking strategies more or less likely, other things being equal, to know more about the subject than a person who adopts another strategy? These are the kinds of questions with which we shall be concerned.

The Evidence

There is a great deal of evidence -- quantitative if not qualitative -- on the uses adults make of the mass media. Television is in more than 90 per cent of American homes. More than

85 per cent of American adults read newspapers, and about two-thirds of them read magazines. Figures on the use of radio are somewhat less firm since that medium has been finding a new role for itself after being displaced by television, but best estimates now say that between 40 and 60 per cent of adults make some regular use of radio. Somewhat less than half of American adults now attend movies regularly -- movies also having been displaced from their previous position by television. And books are read regularly by only 25 to 35 per cent of adults. The television set in the average American home is likely to be turned on more than 40 hours a week, but much of this represents viewing by children and teen-agers; the average adult appears to devote two to three hours a day to it. The time devoted by an adult to newspapers is thought to be, on the average, about three-quarters of an hour a day. (For a recent summary, see Schramm, 1966.)

The evidence also makes clear that the proportion of time devoted to printed media goes up with education: that is, a person with college education is more likely than a person with eighth-grade education to read magazines, and is likely to spend relatively more time on newspapers, less on television. It has been demonstrated by Carter and Ruggels (1963) that when allowance is made for the amount of time devoted to other activities, the proportion of available time devoted to television also increases, even among the highly educated. But this is merely to say that a number of activities -- like lectures, concerts, discussion groups, and adult education -- are more likely to be engaged in by highly educated persons than by others, and these education-related activities reduce the time available for the mass media. Even so, the available time is more likely to be used by highly educated persons for print than for television. Furthermore, insofar as it has been possible to measure, there is good reason to believe that the use of such mass media as television for information, as opposed to entertainment, also tends to increase with the amount of education (for example, Steiner, 1963; Parker, 1963; Schramm, Lyle, and Pool, 1963).

In the case of television and newspapers, however, all such distinctions are relative, rather than absolute: almost all American adults make some use of both newspapers and television. Magazines are more likely to be read by people in the higher education and higher income brackets; books, to be read by school-age people and more highly educated adults; movies, to be attended by younger people.

A national probability sample of 12,000 American households, made by the National Opinion Research Center in 1962 and reported by Johnstone and Rivera in 1965, found that about 25 million adults (roughly one out of four) had been involved in some form of adult learning during the preceding twelve months. About 17 million of these had been engaged in "educational activities," which were defined as all activities consciously and systematically organized for purposes of acquiring new knowledge, information, or skills. These participants in adult education tended to be somewhat younger than the average of the entire sample. All other differences disappeared when education was controlled. It was the amount of education that made the chief difference in the likelihood of participating in adult education activities. When education, occupation, and income were combined, they made a very powerful predictor, as Johnstone and Rivera pointed out:

> a person who had been to college, who worked in a white collar occupation, and who made more than $7,000 a year was about six times more likely to have been engaged in [adult education activities] than a person who had never gone beyond grade school, who worked in a blue collar occupation, and whose family income was less than $4,000 per year.

Greene, in 1962, found that high school graduates were about twice as likely to participate in adult education as persons who had not completed high school.

The NORC study found that 33 per cent of the adult learning activities were vocational, often directed at getting a job or occupational advancement. About 20 per cent were recreational, 12 per cent academic, and only 3 per cent public affairs or current events. The emphasis was definitely on practical information rather than cultural development.

In addition to mass media and adult education channels, interpersonal channels carry an enormous amount of information in our society. There is evidence that a great deal of influence is exerted through these channels (for example, Berelson, Lazarsfeld, and McPhee, 1954; Katz and Lazarsfeld, 1955; Rogers, 1962; and

Coleman, Katz, and Menzel, 1966). On how much public knowledge of science, health, and public affairs is actually acquired through these channels, however, we have no conclusive evidence. Greenberg (1964) has produced some data to indicate that news is most likely to be received through interpersonal channels when it is of very wide or very narrow interest. For example, the news of President Kennedy's assasination was first heard by almost exactly one half the population from some other individual. Lesser stories, such as statehood for Alaska, were first heard, usually, through the newspaper, television, or radio. But stories of very specialized and restricted interest were more likely to be heard from other individuals. Thus the relationship is curvilinear. In any case, when a person is interested in news someone tells him about, he is likely to turn to one of the mass media for further information; and when he is highly interested in news from the mass media, he is likely to talk about it with other persons.

We have found no evidence based on national studies which contributes significantly to our understanding of the use of interpersonal sources as sources of public knowledge in the areas we are studying. We do, however, have studies of two California communities (Parker and Paisley, 1966) which give us at least some idea of the dependence upon interpersonal sources in comparison to the mass media. These data are useful also in comparison with some of the evidence on campaign surveys which we shall present later in this chapter. The two communities are identified in the following table

PROPORTION OF USE OF NATIONAL PUBLIC AFFAIRS INFORMATION SOURCES

	Magazines, Newspapers		Books, Misc. Print Sources		Radio, TV		Interpersonal: family, friend		Interpersonal: group, expert, stranger, unspecified		N	
	SM	F	SM	F	SM	F	SM	F	SM	F	SM	F
SEX												
Male	83	62	4	1	9	10	5	1	10	2	227	469
Female	78	49	8	1	10	14	7	2	10	2	348	825
AGE												
18 - 39	80	53	4	0	12	12	9	0	11	0	195	521
40 - 59	82	57	8	0	7	11	5	2	11	1	239	475
60 and over	77	49	8	0	10	15	4	2	7	0	140	297
EDUCATION												
Less than high school	75	42	3	0	15	16	4	0	6	0	110	518
High school graduate	82	50	5	0	10	11	6	0	12	0	159	301
Some college	82	67	6	0	7	9	7	2	8	1	203	309
College graduate	80	75	10	0	7	7	7	2	15	5	100	155
OCCUPATION												
Professional, managerial	84	70	8	1	5	7	7	2	9	5	193	265
White collar	79	56	6	0	10	13	6	1	15	0	145	291
Blue collar	82	48	2	0	13	14	6	1	7	0	141	545
Housewife, or never worked	70	44	5	0	14	12	1	2	10	0	69	176
INCOME												
Less than $7,000	75	47	6	0	14	14	5	0	8	0	176	800
$7,000 - 9,999	82	62	3	0	10	11	6	2	12	3	154	257
$10,000 - 14,999	82	66	8	0	6	6	7	3	8	1	142	177
$15,000 and over	82	69	8	4	6	4	7	0	13	6	95	54
RESIDENCE												
5 years or less	79	61	7	0	10	11	7	0	11	1	229	248
More than 5 years	81	52	4	0	10	12	6	2	10	0	345	1037

as SM and F. SM is in the San Francisco Bay Area, where the average educational level is high, and the media coverage and cultural opportunities are extensive. Community F is in the central valley of California, and in most of its characteristics is much nearer the average for the United States as a whole. The table, therefore, should be read in terms of two kinds of community, rather than a national average. The table reports results from this question: "What are some of the ways in which you keep yourself informed about national affairs?" It should be read in this way: In community SM, 83 per cent of the males say they make use of magazines and newspapers as sources of information on national public affairs, etc.

In community F, this same study also tried to ascertain the sources used for certain specific nonlocal news that the individual had heard during the last week. Respondents were asked, for example, "Can you think of some item concerning national or international affairs that came up during the past week? What was it? How did you find out about it?" The results appear in the table on the following page.

To the extent that these results can be applied nationally, and to the extent that they represent the areas of subject matter with which we are dealing, it would seem that interpersonal sources do not bulk large, in comparison to the mass media, as sources of public knowledge of these types. It must be noted, however, that there is a great deal of reference back and forth between the media and interpersonal channels, and that anything of real interest in

PROPORTION OF USE OF FIVE SOURCES FOR SPECIFIC NONLOCAL NEWS STORIES, BY TYPE OF STORY AND EDUCATION

	Newspaper	Magazine	Radio	TV	Other People	Number of Responses[a]
International:						
Less than high school completion	42	3	17	38	1	246
Completed high school	42	4	21	30	3	200
Some college	43	7	17	33	1	301
Completed college or more	42	16	16	22	2	191
Domestic-Human Interest:						
Less than high school completion	32	2	21	45	0	47
Completed high school	31	3	25	36	6	36
Some college	48	4	12	34	2	68
Completed college or more	25	10	25	35	5	20
Domestic-Financial & Social						
Less than high school completion	43	0	13	43	0	30
Completed high school	39	0	17	39	6	18
Some college	44	10	15	29	2	41
Completed college or more	32	24	8	28	8	25

[a] The number of responses is equal to the number of people at each educational level who mentioned a specific news story in each category.

the media is likely to be discussed with other individuals.

There is a little evidence from national surveys concerning sources for public affairs, science, and health knowledge. In a number of studies national samples were asked what media they had used to find out about the subject on which they were being questioned, and sometimes which sources they found most useful. For example, in the election years 1952 through 1964, national samples were asked, "How much did you read newspaper articles about the election -- regularly, often, from time to time, or just once in a while?" Similar questions were asked about radio and television. They were also asked, "How many magazine articles about the campaign would you say you read -- a good many, several, or just one or two?" Finally, they were asked, "Of all these ways of following the campaign, which one would you say you got the most information from -- newspapers, radio, TV, or magazines?"

Thus we have trend data from 1952 through 1964 on sources of information during election campaigns. No similar trends are available for health or science, but nearly identical questions about source use are asked in individual surveys. Unfortunately, our source information is largely restricted to mass media to the exclusion of adult education and interpersonal sources, and therefore our generalizations at this time will have to deal mostly with the use of the media.

The Mass Media as Sources of Public Knowledge

Education and life style influence the amount of use made of print media during election campaigns, but all population groups use television.

Let us first look at some of the trend data on use of the mass media for information during national Presidential elections. The three tables that follow were compiled from answers to the questions, "How much did you read newspaper articles [or view television programs] about the election -- regularly, often, from time to time, or just once in a while?" and "How many magazine articles would you say you read -- a good many, several, or just one or two?" The data are from studies by the Survey Research Center.

Overall, education and life styles seem to relate much more closely to the uses of the print than to television media for information during election campaigns. Public affairs television reaches almost all population groups, and increasingly so since 1952. Newspapers and magazines, on the other hand, are much more likely to reach better-educated groups, whites, and readers in the higher income and occupational categories. This is particularly true of magazines. A college graduate is five times as likely as an individual without a high school diploma to use magazines during a campaign, more than three times as likely as an individual who has graduated from high school but has not gone to college. A person with an income of $7500 or over is three and one-half times as likely to

PROPORTION MAKING REGULAR USE OF NEWSPAPERS DURING CAMPAIGNS

	1952	1956	1960	1964
Education				
Less than high school	27%	56%	40%	38%
High school	41	74	57	52
More than high school	49	84	66	61
College graduate	64	96	68	71
Age				
21 - 39	31	65	49	47
40 - 59	38	70	53	51
60 and over	38	70	53	51
Race				
White	37	--	54	51
Other	18	--	28	43
Sex				
Male	41	76	59	53
Female	30	63	45	47
Occupation				
Professional-managerial	52	88	68	65
White collar	43	77	56	53
Blue collar	31	68	51	44
Farm	29	58	39	41
Income				
Under $3,000	--	50	34	39
$3,000-$7,499	--	71	56	49
$7,500 and over	--	86	59	57

PROPORTION MAKING REGULAR USE OF TELEVISION DURING CAMPAIGNS

	1952	1956	1960	1964
Education				
Less than high school	23%	65%	63%	68%
High school	38	82	74	70
More than high school	35	83	78	72
College graduate	41	84	82	72
Age				
20 - 39	29	77	72	64
40 - 59	32	75	72	74
60 and over	19	66	67	72
Race				
White	30	--	74	71
Other	15	--	39	64
Sex				
Male	29	76	73	69
Female	27	72	69	71
Occupation				
Professional-managerial	40	84	85	70
White collar	35	82	67	72
Blue collar	29	71	66	65
Farm	11	54	74	70
Income				
Under $3,000	--	52	53	65
$3,000-$7,499	--	78	76	72
$7,500 and over	--	88	79	70

PROPORTION MAKING REGULAR USE OF MAGAZINES DURING CAMPAIGNS

	1952	1956	1960	1964
Education				
Less than high school	07%	18%	13%	12%
High school	14	32	23	18
More than high school	25	49	43	36
College graduate	32	67	55	59
Age				
20 - 39	12	31	24	24
40 - 59	15	32	26	24
60 and over	11	29	27	24
Race				
White	14	--	27	25
Other	04	--	06	13
Sex				
Male	13	35	26	24
Female	12	28	25	24
Occupation				
Professional-managerial	24	52	50	40
White collar	18	34	24	28
Blue collar	07	23	18	15
Farm	12	37	23	24
Income				
Under $3,000	--	18	13	10
$3,000-$7,499	--	30	23	21
$7,500 and over	--	51	43	35

use magazines for information during campaigns as is a person with income under $3,000. These group differences are less marked in the case of newspapers, but still noticeable.

On the other hand, there is little evidence that the sex role makes any great difference in the uses of these media. It is most noticeable in the use of newspapers, and more noticeable in 1960 and before than it has been since. It may be that because of the rise in the national educational level and the larger numbers of women in politics, wives and mothers now have more incentive to equip themselves with information outside their traditional roles in the family.

Looking at the trend data, one observes a general increase in public affairs use of the media since 1952. In particular, there has been an increase in the use of the print media, and a lessening of the differences between the population groups. The general trend seems to be to seek more information on the events, candidates, and issues of the campaign. Some of the lesser differences in the trend data must be interpreted with caution. For example, the generally high percentages in the 1956 survey areprobably due to a slightly different form of the question being asked in that year -- merely whether the person had used the media, rather than how frequently. The figures for 1960 and 1964 suggest that younger adults may be turning away from television as an election source, but more needs to be known about the combined effects of age and education on the choice of source before we can be sure what this trend means.

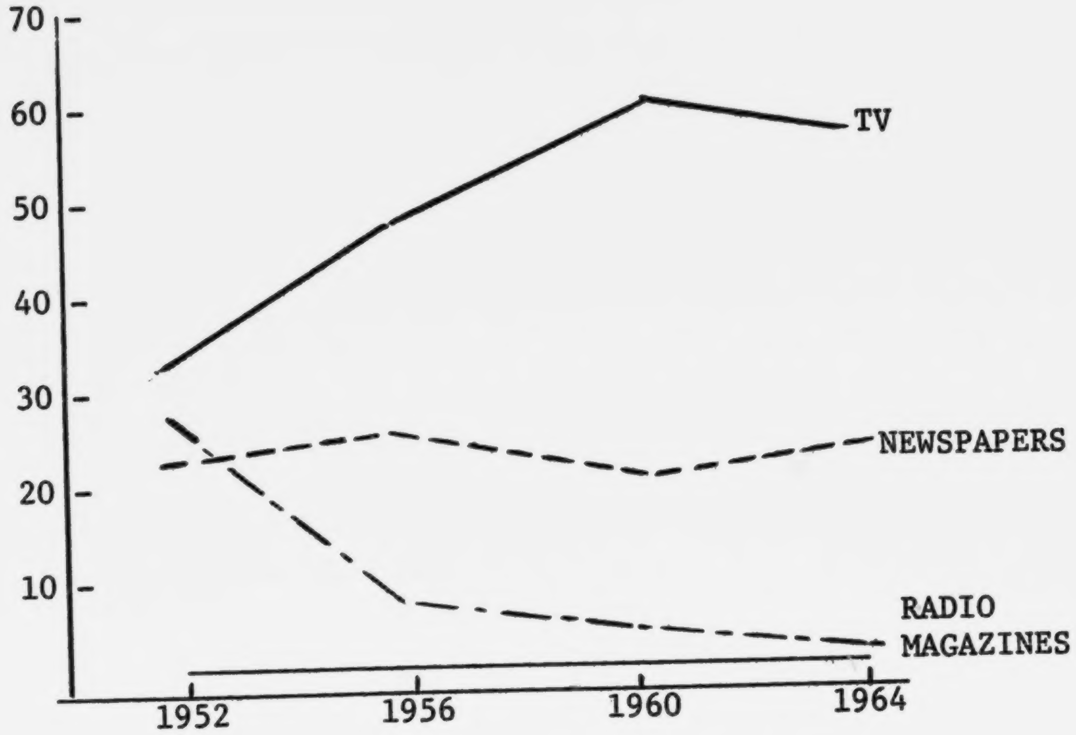
In general, then, the picture that emerges from our data is of about 70 per cent of American adults making regular use of television for information during campaigns, about 50 per cent making regular use of newspapers, and about 25 per cent making regular use of magazines, and television being used by all population groups, while the two print media are more commonly called upon by the upper educational and socio-economic groups. However, it is necessary to say a word of caution about projecting these findings to all public affairs information. At this point, it would be well to look again at the tables reproduced early in this chapter from the two community studies in California. They show newspapers being used proportionally more than television for national public affairs information, and television being used more by the lower than by the higher educational groups. Why should there be this difference?

We suggest that the difference is probably between the way public affairs information is sought during a campaign, and the way public affairs information is sought on other than campaign topics during the time when a campaign is not in progress. The trend surveys were made at the height of campaigns, when the chief news was being made by events -- conventions, debates, addresses by chief political figures, and the like. Through television, a viewer can have the sensation of participating in these dramatic events. When a campaign is not under way, however, public affairs are more likely to be represented by news stories and interpretations than by events; newspapers can cover a wider spectrum of this news, and in greater detail, than television can. Therefore, we probably need to distinguish between news that can be experienced directly, and news that must be reported.

Television has come increasingly to be the source of information most depended upon during national election campaigns.

When people are asked to choose among sources of campaign information -- to say from which source they felt they got the most information during the campaign -- then the trend to television becomes clear. These answers are graphed in the following chart:

MAJOR SOURCES OF INFORMATION ABOUT ELECTION CAMPAIGNS
1952-1964



PROPORTION CITING SPECIFIC MEDIA AS MAJOR SOURCES OF CAMPAIGN NEWS

	Newspapers				Television				Magazines			
	1952	1956	1960	1964	1952	1956	1960	1964	1952	1956	1960	1964
Education												
Less than high school	19%	21%	19%	16%	53%	61%	62%	65%	03%	02%	02%	03%
High school	16	22	22	27	61	65	62	56	05	03	01	03
More	24	30	24	25	50	55	59	50	07	08	07	09
College grad	25	35	22	31	43	44	53	33	12	14	15	22
Age												
20 - 39	18	20	20	21	55	64	63	55	05	04	05	09
40 - 59	19	25	21	23	56	57	61	59	04	05	04	05
60 and over	23	27	22	23	46	58	56	54	05	04	03	04
Race												
White	20		21	23	54		62	55	05		04	07
Other	15		20	17	48		47	69	02		04	01
Sex												
Male	24	28	24	26	49	57	59	53	05	05	05	07
Female	16	21	18	19	56	61	62	59	04	04	03	06
Occupation												
Professional-Managerial	24	30	29	32	48	52	53	42	09	09	12	14
White collar	22	20	26	25	51	66	56	56	07	06	04	06
Blue collar	19	28	21	22	56	57	61	60	02	03	02	04
Farm	19	16	19	15	49	64	70	68	08	08	01	09
Income												
Under $3,000		18	16	14		63	60	66		03	02	02
$3,000-$7,499		25	20	20		60	65	62		04	03	06
$7,500 and over		28	27	30		55	55	48		08	07	09

It can easily be seen that the dependence upon newspapers has remained remarkably steady over the 12 years here represented. Magazines have also continued to be the major source for a tiny and unchanging minority. On the other hand, television has gone up markedly (the high peak in 1960 can probably be attributed to the Kennedy-Nixon debates), and the dependence upon radio has decreased almost as a reciprocal to the increasing popularity of television.

Fully as interesting as the rise of television as major source is the distribution of these choices among the population groups, shown in the following table. Here we find relatively little difference by age, but the other population characteristics all make a difference, and the popularity of television is almost a mirror image of the popularity of the two printed media. That is, television is more likely to be the major source of the lower educational groups, the nonwhites, the females, the farm and blue collar workers, and the lower income groups. The print media are more likely to be major sources for the better-educated groups, whites, males, professional, managerial, and white collar workers, and higher income groups. In other words, even though the use of television is spread fairly evenly over the population, the medium is by no means valued evenly throughout the population.

Newspapers and magazines to a greater extent than television are sources of public knowledge of science.

Although television obviously plays a key role in providing public affairs information, particularly during national election campaigns, the print media provide people with most of their information on science. The pre-Sputnik survey conducted in 1957 by the Survey Research Center asked a number of questions about the media and their use for information on science. Newspapers were most often the source of stories people could recall, as this table illustrates:

PROPORTION OF RESPONDENTS CITING DIFFERENT MEDIA
AS MAJOR SOURCES OF SCIENCE ITEMS THEY RECALLED

	Newspapers	Magazines	Radio	Television
Science	14.1	4.0	1.9	6.3
Medicine	28.9	2.1	1.0	3.9
Total	43.0	6.1	2.9	10.2

Furthermore, if newspapers were not the primary source named by certain respondents, they were almost always the second choice. The following table, which demonstrates this fact, should be read as follows: For people who gave magazines as the primary source of the science items they could recall, 60 per cent listed newspapers as the second choice, and so forth.

Thus it is clear that newspapers are as dominant in providing public sources of science knowledge as television is in providing campaign news. Just as we have raised some doubts as to whether this

PROPORTIONS OF SECONDARY SOURCES FOR SCIENCE KNOWLEDGE ASSIGNED TO DIFFERENT MEDIA BY PERSONS WHOSE PRIMARY CHOICE WAS ONE OF FOUR MEDIA

	Primary Source			
Secondary source	Newspapers	Magazines	Radio	Television
Newspapers	--	60%	34%	59%
Magazines	35%	--	05	22
Radio	10	04	--	11
Television	40	31	29	--
No second choice	13	05	32	08

same dominance would carry over into public affairs information outside election campaigns, so it is interesting to speculate on whether television has become any more important for post-Sputnik science news, especially for space science, now that space launches and other dramatic events associated with the space program have become so common on television. We have no trend evidence on this point, but it would seem likely that we have here exactly the same situation as for campaign news: When public knowledge derives directly from events that are readily available for people to view, then television is more important as a source; when they must be reported or interpreted, then the advantage is with the printed media.

Men, better-educated persons, and persons with higher incomes, are more likely than others to seek science information from more than one source.

The amount of education an individual has is perhaps the chief determinant of how much science information he seeks, as it is of how much he knows about science. Education, income, and the male sex role were the three characteristics we found associated both with the recall of science stories and the use of multiple sources. No other demographic characteristics appeared to be so clearly related.

PROPORTION OF RESPONDENTS WHO COULD RECALL SCIENCE NEWS STORIES WHO CITED DIFFERENT NUMBERS OF MEDIA SOURCES

	At least one medium	None	Three or more media
Education			
Less than high school	36%	61%	03%
High school	67	33	12
More	81	19	21
Sex			
Male	61	39	14
Female	45	55	05
Income			
Under $3,000	31	69	08
$3,000-$7,499	57	43	09
$7,500 and over	71	29	18

Print is more likely than television to be the source of public knowledge of health.

Most of our survey knowledge of the sources of health information in the general public rests upon the national study done by the National Opinion Research Center in 1958, reported by Feldman in 1966. This study does not separate newspapers from magazines as sources, but does indicate quite clearly that these printed media together are the main providers of health information. For example, a person who reads about health in newspapers and magazines appears to be more likely to be able to name several symptoms of diseases like polio, diabetes, and tuberculosis than is a person who views health programs on television. As we would suspect from the previous chapter, women are more likely than men to read about health, and better-educated people are more likely than less-educated ones to do so. But at each level of education and among both men and women, more people report that they read health information often than that they often see TV programs on health, as this table shows.

PROPORTION OF RESPONDENTS WHO USE PRINT OR
TELEVISION FREQUENTLY FOR HEALTH INFORMATION

	Read health often	See TV health often
Education		
Less than high school	28%	27%
High school	31	24
More	41	16
Sex		
Male	28	23
Female	37	23

When these data are further analyzed, it is seen that at every educational level more women than men read about health. At the lowest (less than high school) and the highest (more than high school) levels, men are more likely than women to watch health programs on television; at the high school level, women watch more. Women at every educational level, and men at every level except the lowest one, are more likely to seek health information in print than on television.

Magazines tend to be seen as the most reliable tool for information on "tools for daily living."

What we have just said about the important role of the print media is supported by some incidental data on sources for applied science and health information extracted from the Parker and Paisley study of California communities. In this study, the two kinds of applied information were coded together under the heading of "tools for daily living." The results show that magazines are most often cited as sources for this kind of information, with newspapers second, and radio and television third. Furthermore, it is evident that women, persons in middle age, and white collar families are the chief users of magazines for these purposes. It must be remembered that these are not national figures, but they are entirely consistent with what we have reported from national surveys.

PROPORTION IN DIFFERENT POPULATION SUBGROUPS CITING VARIOUS SOURCES OF INFORMATION ON "TOOLS FOR DAILY LIVING"

	Television	Radio	Newspapers	Magazines	N
Education					
Less than high school	15%	10%	15%	36%	518
High school	10	07	16	43	301
More than high school	10	08	14	40	309
College graduates	09	05	18	40	155
Age					
18 - 39	11	04	16	37	521
40 - 59	12	09	16	44	475
60 and over	13	12	15	33	297
Sex					
Male	10	07	16	33	469
Female	14	09	16	43	825
Occupation					
Professional-Managerial	09	07	15	39	265
White collar	13	07	14	47	291
Blue collar	12	08	18	36	545
Income					
Under $7,000	13	09	15	38	800
$7,000-$9,999	12	08	15	40	257
$10,000-$14,999	07	05	18	44	177
$15,000 and over	13	04	18	37	54

The kind of source makes a difference in the amount and accuracy of knowledge.

We have mostly reported the choice of different mass media sources for different kinds of public knowledge, or the belief of persons as to which media have been most useful to them in providing a given kind of information. It seems desirable now to assemble some data on the amount and accuracy of information people have, as related to the sources they have used.

Looking at the evidence on science information in the Survey Research Center 1957 inquiry we found that 82 per cent of the people who were able to answer all the knowledge questions correctly in the four-question scale used by that survey reported that papers or magazines, rather than television or radio, were their principal sources.

PROPORTION OF RESPONDENTS WITH CORRECT ANSWERS TO FOUR KNOWLEDGE QUESTIONS, AND THEIR REPORTED PRIMARY SOURCES OF SCIENCE INFORMATION

	Number of correct answers				
Reported source	0	1	2	3	4
Newspapers	17%	31%	37%	38%	38%
Magazines	4	8	18	27	44
Radio	3	4	5	2	1
Television	9	23	27	26	16
Print	21	39	55	65	82
Radio and TV	12	27	32	28	17

Furthermore, when we divided the answers according to the depth of information they revealed -- that is, separating out the specific, vague, and "don't know" answers -- we found that print users, on the average, always had more concrete information than persons who said that their chief source was one of the broadcast media. That was the case at each educational level.

Similarly, the persons who were able to name one or more symptoms for each of three diseases in the National Opinion Research Center 1958 survey were more likely, than persons who could not do so, to report regular attention to health items in print. This, also, held true regardless of educational level, and for both males and females. Furthermore, when the amount of knowledge (the number of symptoms a person could name) was measured against the regularity of use of print or of television for health information, a significant relation was found between the amount of information and the amount of reading about health, but not between the information and the number of health programs seen on television. The following table shows this:

PROPORTION OF RESPONDENTS WHO COULD NAME DIFFERENT
NUMBERS OF DISEASE SYMPTOMS, AND THE AMOUNT OF USE OF
PRINT AND TELEVISION FOR HEALTH INFORMATION THEY REPORTED

	Read about health			Saw health programs on TV		
Total number of symptoms named	Often	Occasionally	Never	Often	Occasionally	Never
0-3	17	41	41	21	43	36
4-6	33	45	22	21	45	33
7 or more	47	42	11	28	40	32

(df = 4, X^2 = 69.92,
$p < .001$)

(df = 4, X^2 = 4.82,
n.s.)

On the other hand, when we look at the data on public affairs knowledge, as obtained in the 1964 election campaign study by the Survey Research Center, we find that whether a person reads about elections or views campaign programs on television seems to make a real difference only to people with a high school education or less. For people at those educational levels the use of print as a major source of public affairs news provided a higher proportion of correct answers to specific questions than did major dependence upon television. These differences were not significant beyond the level of high school education, possibly because only minimal information was asked for, and the proportion of correct answer to many questions was very high. Most of the questions merely inquired whether a person had "heard of" so and so, and television can meet that need as well as print in most cases. If we had had the data to construct a scale of depth of knowledge, or public affairs sophistication, as was possible in science and health, we suspect that print-broadcast differences would have been found over all educational levels. It should also be noted that, as we have previously indicated, the conclusions on public affairs knowledge based on election-related questions during an election campaign may not be applicable to other public affairs knowledge. But as the following table demonstrates, there were sizable differences, during an election campaign, only in the two lower educational levels, and those were in favor of print.

PROPORTION OF RESPONDENTS WITHIN DIFFERENT EDUCATIONAL GROUPS WHO WERE ABLE TO GIVE CORRECT ANSWERS TO CERTAIN QUESTIONS, AND THEIR REPORTED MAJOR SOURCES OF PUBLIC AFFAIRS INFORMATION

Educational level:	Less than high school		High School		More than high school		College graduate	
Chief sources:	Print	B'cast	P	B	P	B	P	B
Question								
Johnson's home state	95	90	100	95	98	96	100	100
Who had Congressional majority	82	67	90	79	91	90	95	95
Heard of NAACP	90	79	96	89	98	97	100	100
Heard of Americans for Democratic Action (ADA)	33	26	55	33	57	53	87	72
Heard of Birch Society	78	63	90	81	94	92	99	98
Heard of American Communist Party	79	69	93	77	90	88	97	95

Therefore, so far as our evidence takes us, there is reason to believe that a person whose main source of information in any of these fields in the print media is likely, other things being equal, to have more information and more complete information about the field than is a person whose main source is the broadcast media.

Summing Up: What Does It Mean?

It is unfortunate that we do not have national data on interpersonal sources and adult education as sources of adult knowledge in these three fields. We have been able to report national evidence only concerning the mass media, and, although we have reason to think that they may be the chief sources, beyond the school years, of public knowledge in the fields we are examining, still they represent only part of the pattern of adult information-seeking and knowledge-acquiring.

Our data tell us, however, that the printed media, notably newspapers, are apparently the chief media sources for public knowledge of science and health. For election-related public affairs knowledge, measured during an election campaign, the chief source appears to be television. We have suggested that this may not be true of other public affairs knowledge measured at other times, and indeed the Parker-Paisley study, which is not election-related, suggested that for general public affairs knowledge newspapers may be the chief source, as for science and health. But for election news, television is the chief source and its superiority is growing.

The people-variables discussed at length in the preceding chapter tell us something about the amount of time spent with the different media and the use of one source rather than another. Education, as we have found before, is the key. The social roles defined by sex and age have little to predict about the use of media sources. Career roles described by occupation and income appear to be important only when they interrelate with education so that a man can, for example, compensate for little formal schooling by using the same media sources the well-educated man uses. But the more education a person has, the more likely he is to use print, rather than broadcast, as his major source of news and information. And, as we have just noted, the choice of print as a major source is likely to predict more knowledge and deeper knowledge than a man would have if his major source were not print.

These results can be explained in part from the different natures of the media and the relation of media use to education. With more education, a man learns to read more skillfully, and he acquires the habit and the enjoyment of reading. He turns naturally and habitually to print for information. He can select from a very wide choice of information, work through it at his own pace, and choose almost any level of depth and breadth in his approach to it. With the broadcast media, on the other hand, he finds his selection somewhat reduced at any given time. Someone else decides the pace at which the information is to be given. And because of the medium's emphasis upon entertainment and the need to attract very large and heterogeneous audiences, the news coverage is necessarily scanty -- as the chief network newscasters are the first to admit.

However, it is necessary to consider also the relationship of great news events, covered by television, to the flow of information. There is no doubt that many such events make enormous contributions to public knowledge. Some of their effects have been documented. For example, before the launching of Sputnik, in October of 1957, the Survey Research Center had asked a national sample of adults about their understanding of satellites. A year later, when the name "Sputnik" had entered the American vocabulary, the same questions were asked of another national sample. Comparison of the before-and-after results in the following table will show that after the event the number of persons who had not heard of satellites had dwindled almost to zero, and much higher percentages of the public could talk intelligently about the political and scientific implications.

PROPORTION OF RESPONDENTS AWARE OF SATELLITE PURPOSES
AND POSSIBILITIES, BEFORE AND AFTER LAUNCHING OF SPUTNIK,
AND THE PRIMARY SOURCE OF NEWS THEY REPORTED

Primary Source:	Newspapers		Magazines		Radio		Television	
	1957	1958	1957	1958	1957	1958	1957	1958
Knew science information	22%	34%	38%	47%	10%	19%	16%	25%
Knew of future possibilities and political implications	1	40	1	33	2	44	1	41
Vague answers	15	18	17	14	16	29	16	24
Not heard, or had only misinformation	62	8	44	6	72	8	67	10
N =	654	405	401	257	62	93	425	395

These are most impressive changes, indeed. They occurred no matter what was the preferred source of science information. They demonstrate that the mass media coverage of Sputnik (the information could not have been acquired from school) contributed notably to public knowledge of science -- again, whether or not the preferred source was broadcast or print. But it is worthy of note that the chief differences are in the political rather than the scientific understanding of satellites. People did indeed learn something about space, and orbital speed, and related matters, but in far greater numbers they learned about what the possession of satellites might mean in international politics, and how the Soviet progress in this field compared with that of the United States. This may be a key to the kind of learning that goes on as a result of the great events that move through the mass media. Some incidental learning of scientific knowledge takes place, but the chief information that rubs off is likely to be somewhat more ephemeral, and to be concerned with science politics rather than science, with a general picture of environment rather than a deep understanding of it.

The Sputnik launching was not given the kind of television coverage that American space flights later received. A great event which did receive enormous television coverage, however, was the assassination of President John F. Kennedy, in 1963. Certain studies of public knowledge were made in the days immediately following the event, and some of the same questions were asked 19 months later, in June of 1965. One of these questions asked respondents to name the Presidents who had previously been killed while in office. Immediately following the death of President Kennedy, 37 per cent of a national sample were able to name all three (Lincoln, Garfield, McKinley). No one doubts that the correct answers would have been much fewer if the question had been asked a few days before the assassination. When the same question was asked, 19 months later, the proportion able to name all three of the previously martyred Presidents had fallen to 16 per cent.

PROPORTION OF RESPONDENTS ABLE TO RECALL NAMES
OF ASSASSINATED PRESIDENTS

	November, 1963	June, 1965
All three	37%	16%
Lincoln and one other	31	30
Lincoln alone	22	41
Garfield or McKinley	2	2
N =	1384	1469

Perhaps the most interesting feature of the table just given is that the percentage of persons able to name Lincoln as an assassinated President varied hardly at all between surveys. That information doubtless was learned in school. As a result of the enormous publicity given to the assassination of Mr. Kennedy, however, a number of people learned other specific bits of information. When the issue was no longer critical, public knowledge "reverted" to a normal level, and many of these additional bits of information were forgotten.

This fits with what we have found about the apparent differences between television as a source of election-related information during campaigns, and as a source of more general public affairs information between campaigns. Tentatively, we can say that the public affairs, science, and health information to be learned from television is more closely related to great events than is the information to be obtained from newspapers and magazines. It is more time-bound, more likely to be limited to facts and feelings rather than concepts and understandings.

We know that what happens to a person in school has a close relation to his ability to use the mass media and his choice among them. In the next chapter we must return to the relationship of education to media use, and both to public knowledge, but here let us suggest a pattern for later consideration. From school we emerge with a cognitive map, with an organized life space, and with certain learning skills and habits. Through the media we chiefly fill in this map. Through the media we add many of the facts that constitute our picture of environment. From the parade of events through the media, and especially from television which is the most vivid and dramatic carrier of events, we tend to fill in these environmental items, but not to do much with the map itself. But when we turn to the more school-like experiences which we can find somewhat more easily, if we want to find them, in the printed media, then we may make a contribution to the map itself. We may add an understanding of process or structure or pattern, which will be useful in organizing other experiences and other information. This, we can assume, is one reason why the printed media are more likely to serve as a source of long-term science knowledge, and the broadcast media as a source of political facts which are useful in an election campaign that calls them forth, and easily forgotten thereafter.

IV. THE PREDICTORS OF KNOWLEDGE

In the first two chapters we tentatively identified an interaction between education and later information-seeking. This seems to underlie the distribution of knowledge in the American public. In the third chapter we looked at the evidence on how people use the mass media as sources of information. Now we are going to look in greater detail at the "predictor" variables -- the characteristics of people that help us to predict how much knowledge they will have in a given area -- in order to seek more clues as to how and why people obtain the knowledge they have.

We are going to take one outstanding national study in each of the three areas, and subject each to more sophisticated statistical analysis. The three we have selected are the 1957 Survey Research Center study of science, the 1958 National Opinion Research Center study of health, and the 1964 Survey Research Center study of public affairs knowledge in a Presidential campaign year.

Each of these studies contained questions that could be summed as an index of knowledge against which we could measure characteristics of the respondents. In the science study this was a group of four questions: the purpose of space satellites (just before Sputnik), purpose of water fluoridation, the meaning of radioactive fallout, and the identification of polio vaccine. In the health study an index could be made from the total number of symptoms a person could name for three diseases -- polio, tuberculosis, and diabetes. In the public affairs study an index was made from 18 questions that required the respondent to give certain facts about the Presidential candidates, and to report whether he had heard of certain political organizations.

Using each of these indices as an estimate of knowledge, we then tried to find out, by means of multiple regression and partial correlation (a) how well we could predict a person's knowledge from all the information we had about the person, and (b) what was the smallest number of variables that would efficiently predict his level of knowledge? Before we combined all the variables into a predictor set, we dichotomized each predictor into categories which, by reference to our earlier bivariate analyses, we knew bore some relation to knowledge. Our dependent variables remained in their full distribution. So what we had was a set of classifications into which a person might fit and we placed these as point variables into the multiple linear regression equation as predictors of knowledge. We shall present these results in the following pages.*

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*We have used the multiple linear regression model as the simplest approach to considering a large number of variables simultaneously as predictors of knowledge. We are aware of the possible difficulties which affect the efficiency of the model -- skewness, nonlinearity in relation to the dependent variable, bivariate or multivariate interactions, and so on -- but it has certain heuristic advantages over other possible modes of analysis for these purposes.

The General Finding

We found, in each of these three subject matter areas, that

(1) A large number of variables -- sex, age, education, media use, income, occupation, interest, and so forth -- are apparently related to the level of knowledge. But,

(2) In each case, a very few of these variables -- usually three -- would predict the level of knowledge almost as well as the entire group.

Science Knowledge

The science study was richer than most surveys in information which might be expected to relate to an individual's level of knowledge. That is, we had not only the usual descriptive facts -- age, education, sex, and so forth -- but also the person's own report of how much interest he had in science, whether he had taken science in high school or in college, how much he used each of the mass media, what he regarded as his major source of science information, and the like. When we put all these predictors into the computer, we found that we could account for about 37 per cent of the variation in science knowledge.

Why not more? There are several possible explanations which apply not only to science but to health and public affairs as well. We would hope that our indices are good measures of knowledge in a particular area, but we know that they are far from ideal. We know we cannot hope to measure comprehensive knowledge in any area by 18 questions in public affairs, let alone four in science and three in health, regardless of the depth of response each question demands. Then, too, we have no way of knowing how to assess the penetration of knowledge -- did someone answer correctly because the information is really a working part of his life space or because he happened to read or hear something pertinent in the media the evening before he was interviewed. These are problems common to all surveys, not just the ones we have worked with.

Finally, there is the problem of the model we are using. Multiple linear regression assumes a linear relationship between the independent and dependent variables which is not always easy to find in field studies. Any departures from linearity and any interactions, as we have noted before, tend to underestimate the strength of a relationship between two variables until we are able to identify the precise form the relationship takes. We have seen several instances of curvilinearity in the preceding pages, but the heuristic advantages of the linear model led us to accept any possible underestimates as conservative measures of the combined predictive power of our independent variables. Under these circumstances, 37 per cent of variance explained is by no means a discouraging figure inasmuch as it represents a very high correlation (.61) between descriptors and knowledge.

In the following table, we have listed the chief descriptive variables available to us in this survey. The first column of figures represents the zero-order correlation between the particular

RELATION OF CERTAIN DESCRIPTIVE VARIABLES TO SCIENCE KNOWLEDGE

Variable	Correlation with science knowledge	Partial correlation
Education (high school or above)	.44	.12
High school science	.41	.09
Income ($5,000 or more)	.38	.20
Print as major source of information	.35	.18
Occupation (white collar)	.29	.09
Newspaper use (daily)	.29	.09
College social science	.26	.03
High science interest	.25	.12
Race (white)	.23	.14
Age (under 40)	.19	.07
Sex (male)	.13	.12
Radio use (2 or more hours daily)	.05	.03
TV use (3 or more hours daily)	-.03	.03

(Any correlation above .05 significant at the .01 level or bette

descriptive variable and the level of knowledge. That is to say, if we know only whether an individual had graduated from high school, that information would correlate at the level of .44 with his science knowledge. That correlation is statistically significant at a very high level of probability; indeed, anything over .05 is statistically significant at the .01 level or better, because of the very large sample in this survey. The second column of figures tells us what the correlation for the particular variable would be if the effect of all the other variables were removed. Thus, if all the other variables were held constant, the correlation between education and knowledge would be only .12. This means that education correlates highly with certain other descriptive variables in our list (for example, high school science courses), and we could leave out some of the variables without much loss in predictive power. The table, then, should be read: If we know whether an individual has had at least high school education, on the average this information will correlate very highly with his level of science knowledge, and if all other descriptive variables are held constant it will correlate much less highly, but still significantly.

We have noted that all these descriptive variables, considered together, would allow us to predict 37 per cent of the total variation in science knowledge. Suppose, now, we were to predict using only one variable. Here is how much we could explain:

PROPORTION OF VARIANCE IN SCIENCE KNOWLEDGE
EXPLAINED BY VARIABLES CONSIDERED INDIVIDUALLY

Variable	Percentage of variance explained
Education	.19
High school science	.17
Income	.15
Use of print as major source	.12
Occupation	.08
High science interest	.06
Sex	.02

We should like if possible to find a combination of variables more efficient than any single one of these, but less cumbersome than the entire list. We tried a number of combinations. The seven variables listed above would let us predict about 34 per cent of the variation. Using six of them would reduce our predictive power only to 33 per cent. Four would cut it down to 31 per cent. But a combination of three would still allow us to predict 30 per cent of the variation. Here are some of the best combinations:

TOTAL PROPORTION OF VARIANCE IN SCIENCE KNOWLEDGE
EXPLAINED BY DIFFERENT COMBINATIONS OF
DESCRIPTIVE VARIABLES

	Education	Education	Education	Income
	Income	Income	Income	Print as major source
	Occupation	High school science	Print as major source	High school science
	Print as major source	Print as major source		
	Science interest			
	Sex			
TOTAL EXPLAINED	33%	31%	30%	29%

Thus, by knowing the level of people's education, their income, and whether they use print or something else as a major source of science information, we can still predict 30 per cent of the variation in their levels of science knowledge. With these three predictors only, we come within seven per cent of the prediction we could make with 15 predictors.

We might consider for a moment what we are doing when we choose in this way from among possible predictors. We are looking for things about an individual that are closely tied to knowledge of science. We are trying to find a clue, not only to help us to predict science knowledge without actually measuring it, but also to understand how such knowledge may be acquired. It is not surprising that we find many characteristics of a person related to his level of knowledge; one acts, selects, learns as a whole person, not merely as a female or a 30-year-old or a newspaper-reader or a high school graduate. But to predict knowledge from only a few characteristics of the individual we need to find characteristics that tend not to overlap others. For example, we know that general level of education and whether or not science was studied in high school correlate very highly with each other (.68). Education is a bit stronger as a general predictor of science knowledge, and therefore we lose little by dropping out the question of whether the individual took science in high school. Notice that we are not saying it is of no importance whether he took science in high school; it is of considerable importance. But if he has graduated from high school, it is very likely that he has taken some high school science courses. Therefore, we can use one of the measures and know almost as much about the person's probable level of science knowledge as though we had used both measures.

Income and use of print as a major source are therefore more efficiently combined with education than with high school science.

These two measures will add about 11 per cent to the explanatory power of education alone, and each one of the three is a good predictor when either or both of the others is held constant, as the following table shows:

CORRELATION OF EACH OF THREE DESCRIPTIVE VARIABLES
WITH SCIENCE KNOWLEDGE WHEN OTHER TWO
ARE HELD CONSTANT

Variable	Education constant	Income constant	Print constant	Both of others held constant
Education	--	.35	.38	.31
Income	.27	--	.34	.26
Print	.26	.31	--	.24

Returning for a moment to the number of people with high knowledge of science in our 1957 survey we find a strong linear relationship between the variables in the table that follows. Regardless of how the table is read -- left to right, top to bottom -- we can see that more education, more exposure to science news, and higher income lead to more science knowledge.

What is the significance of the fact that education, income, and use of print emerge as most efficient predictors of science knowledge?

Education, we can assume, equips a person with his fundamental ability to follow science and an interest in following it. Our surveys are measuring not chiefly the science knowledge acquired in school, but rather what has been learned after the school years;

PROPORTION OF PEOPLE WITH HIGH SCIENCE KNOWLEDGE BY SCIENCE NEWS EXPOSURE AND INCOME WITH EDUCATION HELD CONSTANT

		Under $3,999 per annum	$4,000 and over per annum
0-8 years in school	Low exposure	.07	.18
	High "	.23	.43
Some high school	Low exposure	.22	.37
	High "	.31	.61
High school completed	Low exposure	.35	.54
	High "	.50	.71
More than high school	Low exposure	.29	.67
	High "	.55	.82

High science knowledge = at least 3 out of 4 questions correct
High science news exposure = "reads some or all" nonmedical science in print

indeed, science develops so fast that nothing except fundamentals remains unchanged after a decade or two out of school. Therefore, it is not surprising that the fact of having gone through high school and perhaps beyond is a better predictor than the fact of having taken science courses. With more education come better jobs and higher income, as well as skill in reading and the habit of seeking information in print. With higher income comes an ability to buy the publications where one is more likely to find science information. In other words, more education makes attention to print more probable, and higher income makes it more possible. We are not in a firm position to say what is the direction of causality, and, indeed, there is probably an interaction. But it makes sense intuitively to think of education as a primary variable, income as an intervening one, and the use of print as determined largely by the other two; so that education makes for income, and both lead to high use of printed media. And therefore the science knowledge measured in these studies is likely to come largely from current printed sources.

We can clarify the picture slightly by examining the correlation of the chief variables with the different parts of the science index, as is done in the next table:

ZERO-ORDER CORRELATION OF CHIEF DESCRIPTIVE VARIABLES
WITH DIFFERENT PARTS OF SCIENCE INDEX

	Index questions dealing with:			
Variable	Polio	Satellites	Fallout	Fluoride
Education	.29	.30	.34	.33
Income	.19	.28	.27	.27
High school science	.26	.25	.31	.32
Print as major source	.23	.22	.25	.28

Education is correlated highly with all the questions, though more highly with the questions on fallout and the fluoridation of water. So also is high school science; it may be that these latter questions tapped a more specialized or difficult area of science, less likely to be obtained from the mass media. Why does income relate so much less closely to knowledge of polio, than to the other topics? It seems likely that the threat of polio, in 1957, was a very personal thing that spread over all groups, and led low-income as well as high-income families to seek information about it. It is also likely that developments in polio vaccine were widely covered in popular form by all the media, and much talked about, and in this respect it may be significant that print is less useful as a predictor of knowledge about polio than, for instance, of fluoridation. In general the combination of education, income, and use of print proves to be a powerful one throughout.

Health Knowledge

In earlier analyses of the health survey we found that intimate personal variables like state of health, so far as that could be measured by opinion surveys, seemed to have relatively little to do with the kind of knowledge of health being measured in the study. The more traditional descriptive items seemed to be more useful. We therefore combined the most promising of these and found that altogether they would predict 19 per cent of the variation in health knowledge. This is not a spectacular result (it represents a correlation of .44), and indicates that some variables of importance are not being measured, or that knowledge of health is strongly determined by the perceived relevance of a given item of information -- for which we have at hand no measure.

Here are the descriptive variables we found useful:

RELATIONSHIP OF CERTAIN DESCRIPTIVE VARIABLES TO HEALTH KNOWLEDGE

Variable	Correlation with health knowledge	Partial correlation
Education (high school or more)	.27	.20
Read often about health	.25	.21
Sex (female)	.22	.20
Race (white)	.21	.18
Age (declines with increasing decades)	.10	.05
See TV health programs often	.06	.01
Region (South or West)	.05	.04

(Any correlation over .09 significant at the .01 level or better.)

This table suggests that a white female who has at least a high school education and frequently reads about health is more likely than other people in the population to have a high level of health knowledge. We noted in earlier chapters that knowing about health seems to be one of the role requirements of the mother in our society. Race was highly correlated with education among the respondents in this study, and in any case the numbers of minority people in the survey were not sufficient to justify any grand conclusions. But all these predictors together explained only 19 per cent of the variation.

Taken separately, no single one of the variables explains a large part of the variance, as this table indicates:

PROPORTION OF VARIANCE IN HEALTH KNOWLEDGE EXPLAINED BY VARIABLES CONSIDERED INDIVIDUALLY

Variable	Percentage of variance explained
Education	.07
Print	.06
Sex	.04
Race	.04
Age	.01
Others	less than .01

Taken together, the first five of these descriptive variables explained as much of the variance as did the whole list, and three of them -- education, use of print, and sex -- explained within two per cent as much as the entire list:

TOTAL PROPORTION OF VARIANCE IN HEALTH KNOWLEDGE EXPLAINED BY DIFFERENT COMBINATIONS OF DESCRIPTIVE VARIABLES

	Education Print Sex Race Age	Education Print Sex
TOTAL EXPLAINED	19%	17%

These three remaining variables are strong predictors separately from the others, as is shown by these correlations:

CORRELATION OF EACH OF THREE DESCRIPTIVE VARIABLES WITH HEALTH KNOWLEDGE WHEN OTHER TWO ARE HELD CONSTANT

Variable	Reading constant	Education constant	Sex constant	Both of others held constant
Reading about health	--	.28	.28	.25
Education	.25	--	.27	.24
Sex	.20	.21	--	.19

Accounting for less than one-fifth of the variability in knowledge is not a long step toward understanding how we process health information. When we consider the relation of the final predictor variables to knowledge, however, we can see part of our problem in accounting for variance in the table below. There is an interaction between education and reading about health that suggests frequent reading is not always helpful above a high school education. This departure from linearity and the highly specific nature of the dependent variable no doubt combine to depress the true relationship between our predictors and health knowledge. Nevertheless, what we have makes possible some conjectures and some comparisons with what we have already found out about science knowledge.

Both education and use of the print media apparently are basic to science and health knowledge. In health, even more than in science, we have reason to suspect that education is the primary variable, contributing skills and interest, and predisposing individuals to use the media where most of the information being measured is to

PROPORTION OF PEOPLE WITH HIGH HEALTH KNOWLEDGE
BY SEX AND READING ABOUT HEALTH
WITH EDUCATION HELD CONSTANT

	Men	Women	Read often	Read occasionally	Read seldom
Less than high school	.02	.08	.09	.01	.01
High school completed	.06	.16	.21	.10	.01
More than high school	.16	.29	.32	.12	.21

High health knowledge = 3 or more symptoms for each of 3 diseases

be found. Articles on how to detect and prevent disease and on child care and family health, are common in women's magazines. The importance of the sex role in health information has been amply documented. The most interesting difference is that income is not a strong predictor of health knowledge, although it did help strongly to predict science knowledge. (It will be recalled also that income was less highly correlated with the polio question than the other three questions in the science index.) A reasonable conclusion is that health knowledge is a requirement that spreads widely across income groups.

Public Affairs Knowledge

The public affairs survey, like the science survey, was rich in useful descriptive variables beyond the common ones. It recorded, for example, how much time individuals had typically spent with each of the media during the campaign, and how interested and active in politics they said they were. The figures on media use were recorded separately, and also combined into an index of media use. Here is the list of available predictors, incorporating the media use index rather than records on use of the separate media:

RELATIONSHIP OF CERTAIN DESCRIPTIVE VARIABLES TO PUBLIC AFFAIRS KNOWLEDGE

Variable	Correlation with public affairs knowledge	Partial correlation
Media use index	.46	.32
High campaign interest	.43	.19
High political activity	.41	.16
Follow government activities	.38	.14
Education	.32	.13
Income	.22	.05
Occupation	.21	.05
Race	.14	.12
Sex	.08	.03
Age	.04	.01

(Correlations over .07 significant at the .01 level or better)

Taken together, these descriptive variables explained about as much of the variation in knowledge as did our list of science predictors -- 39 per cent. Unlike both science and health, however, education is not the chief predictor of public affairs knowledge. Actually, it comes fifth, after media use, campaign interest, and activities related to politics and the campaign. By itself, education explains only 10 per cent of the variance.

When we look harder at the intercorrelations, however, we discover that political activity and the following of government activities are closely related to campaign interest, and actually contribute little more to the total than does interest by itself. Furthermore, when we talk about an index of media use, we are counting regular use of each of four media for campaign information. For our purposes, it is not very helpful to say, simply, that general attention to media during a campaign leads to more public affairs knowledge. So we separated the index into its parts and found these correlations between the components and our more general measure:

Radio	.61
TV	.61
Newspapers	.47
Magazines	.55

As we have already reported, television is considered to be the major source of campaign information by a large number of people. High use of television by itself correlates more closely with the level of public affairs knowledge than the other media -- radio (.24), TV, (.48), newspapers (.04), and magazines (.39) -- as well as the media index. Including the use of newspapers seems to depress the correlation of the index with our knowledge measure. Television use by itself is, therefore, the best single predictor of public affairs knowledge during a campaign, as the following table illustrates.

By knowing the amount of use people make of television during a campaign we can predict 23 per cent of the variation in their public affairs knowledge. By knowing all the variables we can predict 39 per

PROPORTION OF VARIANCE IN PUBLIC AFFAIRS KNOWLEDGE EXPLAINED BY VARIABLES CONSIDERED INDIVIDUALLY

Variable	Percentage of variance explained
High use of TV	.23
Media use index	.19
Campaign interest	.18
Political activity	.16
Follows government activities	.14
Education	.10
Income	.04
Occupation	.04
Race	.02
Sex	.01
Others	less than .01

cent. Certain combinations of three variables, however, are very good predictors. Here are the two best ones:

TOTAL PROPORTION OF VARIANCE IN PUBLIC AFFAIRS KNOWLEDGE EXPLAINED BY DIFFERENT COMBINATIONS OF DESCRIPTIVE VARIABLES

	High use of TV Education Campaign interest	Media use index Education Campaign interest
TOTAL EXPLAINED	38%	34%

Thus, by ascertaining the amount of television use, the degree of interest in the campaign, and the educational level of a sample, we can predict within one per cent as much of the variation in their public affairs knowledge as by ascertaining all the 12 variables available in this survey.

Our predictors of public affairs knowledge explain the largest amount of variance in any of our subject areas, yet even they do not reach 50 per cent. When we see how those persons who answer correctly fit into the separate predictor classifications, we note the differences in kinds of knowledge required by the relative size of the percentages in the table that follows. We can also see the severely limited distribution of television's effect on a combined public affairs index while the relationship of interest and education to separate parts of the index appears to be linear. Both of these factors limit the efficiency of the regression model.

PROPORTION OF PEOPLE WITH HIGH KNOWLEDGE OF
PRESIDENTIAL CANDIDATES AND POLITICAL ORGANIZATIONS
BY INTEREST IN CAMPAIGN, EDUCATION, AND USE OF TV

	Presidential candidates	Political Organizations
Not interested	.12	.13
Mildly interested	.18	.26
Very interested	.29	.59
Less than high school	.10	.19
High school completed	.24	.37
More than high school	.33	.59

	Candidates/organizations combined
Did not use TV during campaign	.65
Occasionally used TV	.66
Regularly viewed campaign coverage	.81

High knowledge of Presidential candidates = at least 3 correct on a 4-question scale

High knowledge of political organizations = identified 7 out of 8 possible groups

The most efficient predictor variables are each potent in the combination, as can be demonstrated here:

CORRELATION OF EACH OF THREE DESCRIPTIVE VARIABLES WITH PUBLIC AFFAIRS KNOWLEDGE WHEN OTHER TWO ARE HELD CONSTANT

Variable	TV constant	Education constant	Campaign interest constant	Both of others held constant
High use of TV	--	.49	.40	.44
Education	.33	--	.25	.29
Campaign interest	.36	.39	--	.30

It is quite clear that the process of acquiring information about public affairs -- at least during a campaign -- must be a different sort from the process of acquiring science or health information. With both science and health, education is the chief predictor and apparently the prime mover in the process. In the case of public affairs, education is probably a facilitating variable, and campaign interest may be the chief mover. But it is the mass media, and especially television, that make the most difference.

Implications

A pattern begins to emerge from these multivariate analyses. The outlines of the pattern can be suggested by the following table, which has been constructed from the best predictors found for each of our subject matter fields.

PROPORTION OF VARIANCE EXPLAINED BY DIFFERENT KINDS OF DESCRIPTIVE VARIABLES IN SCIENCE, HEALTH AND PUBLIC AFFAIRS KNOWLEDGE

Subject Area	Explained by education	Media	Personal variables	Total explained
Science	.12	.10 (print)	.08 (income)	.30
Health	.07	.06 (print)	.04 (sex)	.17
Public affairs	.09	.19 (TV)	.10 (interest)	.38

It is interesting that education and media use should appear as the best two predictors in each of the three combinations. In science and health, education is the chief predictor; in public affairs, media use predicts most efficiently. But in each case the combination of these two accounts for well over two-thirds of all the variation we are able to predict by all means at our disposal.

What is the process that must be going on? A very high proportion of the information being measured must be derived from the current media. But education must be contributing to the skills, the ability to understand, the interest in serious information, and the habit of seeking it. Education, as we have suggested before, must be outlining a cognitive map which the individual spends the rest of his life filling out and, to some extent, revising. Education must be arousing a curiosity that lasts after the school years.

In the case of science, it is the printed media that seem to be the chief source. This is true also of health. In public affairs, during a campaign year, however, the dependence is overwhelmingly on television. The reason is not hard to see. Television has come to carry the dramatic events of campaigns -- the party conventions, the meetings, the interviews and confrontations, occasionally debates like those of Kennedy and Nixon, and exciting coverage of elections. Health material is much more likely to be found in magazines; science material in magazines and newspapers. Nor is it hard to understand why the media should play a relatively more important part in public affairs knowledge than in science or health knowledge. Politics requires a less systematic school foundation, and gets a great deal more attention from the news media, than do science and health.

Education is thus a preparatory experience; the media are current sources. The personal variable combined with these two in each area is one that helps to determine who makes most use of the current sources. In the case of health, it is the woman; that is her role. In the case of public affairs, it is the person deeply interested in politics. In the case of science, it is the person whose income enables him easily to satisfy his needs for information; income also indicates whether he holds the kinds of job and moves in the kinds of circles where science knowledge is likely to be highly valued.

Simply stated, this is the pattern that seems to emerge: Educational level tells us the probability that a person will actively seek out information; the pattern of media use tells where he will be most likely to seek it; and the other variables help us to know the kind of person within an educational level who will be likely to seek the most information.

V. SUMMARY AND CONCLUSIONS

When we began, four chapters ago, we pointed out some of the deficiencies of our data. We were dealing with a number of surveys made at different times by different scholars and different organizations for different purposes. For the most part the purposes were to measure opinions or to make news, rather than to study the distribution of public knowledge and its sources.

Unquestionably if the understanding of these problems is to be advanced we need new studies of several different kinds:

For one, we need studies of the individual's universe of knowledge -- what he knows, at what depth, about what subjects, and how he organizes it.

Second, we need sample surveys of public knowledge in these or other substantive areas _at the same point in time_, so that we do not have to guess whether a 1952 result is comparable with one obtained in 1964, or whether it is still usable in estimating public knowledge. We need such studies over a sufficient number of areas or topics so that we can get a broad view of public knowledge, and we need them on sufficiently large samples so that we can apply appropriate statistical analysis with some confidence.

Third, we need studies of public knowledge _in depth_ -- that is, not at one level of knowing, but at several levels so that we can find out not only whether a person knows something about a topic, but also how much and what kind of knowledge he has about it. One of the unfortunate characteristics of most previous surveys in this field is that they have tended to seek answers at a single level, and that a rather superficial one.

Fourth, we need studies that will gather information on the sources of such knowledge as we have specified, for the same individuals, and in a much more detailed way than source data have typically been gathered. The usual practice has been to ask, in national surveys, what the respondent considers to be his main source of knowledge in a given field; or how much use he makes of the different media. A few local studies, like that of Parker and Paisley, have tried to follow up the source of a given bit of knowledge, and have given some attention to the interpersonal and adult education sources as well as the mass media. This kind of thing should be done on a national scale.

It may be possible to gather breadth, depth, and source data all at one time, but probably it will require a series of interlocking studies before we can make a map of source availabilities and knowledge levels, and before we can understand how they interact.

Nevertheless, the body of data we have been able to assemble for this study is larger than has ever before been available to anyone trying to understand the state of public knowledge in the United States. It includes more than 300 knowledge questions asked of national samples in the last 20 years, and among them several careful and intensive studies of knowledge and opinions of science, health, and public affairs. We have done with it what we could.

The distribution of knowledge. We have been unable to compare public knowledge across topics, because there is no sure way of telling whether a question about science, for example, is comparable in any meaningful way with a question about public affairs; and we have been uneasy about comparing across time, although we have been able to make use of a number of time series of nearly identical questions asked in different years. Nevertheless, we have advanced some conclusions as to how knowledge of science and public affairs, and health is distributed in the American public.

In the first place, whereas we do not know how to say whether a given level of knowledge is good or bad, we have certainly found no reason for special gratification in the amount of knowledge revealed by the surveys we examined. If roughly one-third of American adults can (a) name one of the two Senators from their state, (b) name their Congressman, (c) explain simply what is meant by the Electoral College -- that does not seem to be a strong basis for democratic participation. If only one-fifth of American adults, in two surveys during the 1950's, could name all three branches of government, that is hardly a vote of confidence for public school civics classes. And if only a little over two-thirds could name the Vice President of the United States in the election year of 1952, that says something about the office, about the news, or about the dimensions of public interest in political matters.

On the other hand, between 1940 and 1955, the proportion of

American adults able to name one or more symptoms of cancer almost doubled -- to 68 per cent. This is doubtless a reflection of the continuing campaign to bring about preventive health measures. Between 1955 and 1961 the proportion of adults able to explain the term "radioactive fallout" more than tripled, and this is a reflection of news and media coverage.

Public knowledge is apparently distributed in a J-curve. Every individual has really deep and sophisticated knowledge of a very few areas, and knows a considerable number of facts about a large number of areas, and his knowledge tails out over a very large number of subject areas of which he knows very little indeed. Similarly, knowledge of a given subject within the adult public tends to be concentrated in certain individuals and groups, and then to tail out over a very large number of persons who know almost nothing about the matter. Even amongst the demographic groups that we regard as relatively well informed -- the highly educated, for example -- we find still a large number of individuals who have little or no knowledge on any given subject. These know-nothings exist in every demographic group at every level, and the chief difference in knowledge between groups seems to come not from a general level of understanding, but rather from the proportion of members who have become well informed about the topic. That is to say, a group of college-educated people will include more than will a similar group of grade school-educated people, of individuals who will be well informed on any given area of science, health, or public affairs, but even amongst the college group there will probably be a substantial number unable to answer the question.

In general, we find that knowledge of these three subjects is distributed very unevenly in the American public. Adults who have not gone through high school, who have incomes in the lower third of the national distribution, who are in farming or blue collar occupations, have on the average less knowledge of science, health, and public affairs than others. People over 50 tend to have less knowledge of these fields than do younger people; nonwhites to have less than whites; and people who live in the South to have a little less than people in some of the other regions of the country.

Yet, most of the other differences fall out when education is controlled. Income and occupation are very closely related to education; indeed, education prepares its graduates for certain occupations and equips them to earn larger incomes. Older people may feel less need to seek information and have less money to buy it; but most of the difference in knowledge amongst the older groups can be explained by their lower average levels of education and the fact that their schooling is less current. The nonwhites typically have less education, lower incomes, jobs that make less requirement of current information; there is nothing about the color of a skin that would seem to relate to knowledge level. And regional differences, too, seem to wash out when one takes account of education, income, and the availability of information sources. We have no evidence that geography, any more than skin color, is a determinant of level of public knowledge.

Only in the lowest educational groups -- the people who did not complete high school -- do any of these variables seem to make a difference independent of education. This is an interesting finding. Apparently people who have not gone through high school have in many cases not acquired the interests and skills that would lead them to continue to seek information and enable them to understand it. Among these people, occupation, income, and age make a real difference. On the other hand, high school graduates and people who have had some college work have apparently come away with enough tools and incentive to go on learning; and for them, income, occupation, and age make little difference when the effect of education is eliminated.

Education therefore stands out as the powerful variable. But it is not the only one. Role prescription, illustrated by the sex role in our society, makes a real difference. Women know more than men about health, regardless of education. Men know more about public affairs. It is the woman's role to be concerned with the health of the family; the man's, to be concerned with politics. Interest and activity in a given field clearly make a difference, although we have had a chance to measure it only in public affairs, where an interested and active individual will have more political knowledge than will an uninterested individual, regardless of education. We need have no doubt that an individual deeply interested in science, who may have a laboratory of his own and who reads scientific magazines, will know more about it than an equally educated person who is not much interested. Psychological distance (the apparent pertinence or usefulness of a subject area) also seems to make a difference. Finally, except for education, a person's use of the mass media seems to have most to do with what he knows. Not only how much use someone makes of the media in seeking information, but also whether he depends more on print or on television, seems to make a significant difference, to which we shall now turn.

Sources of knowledge. As we have said earlier, the available evidence on the relation of information sources to amount of knowledge is not extensive. The evidence we have shows that more knowledge goes with more use of the media. Some of the responses to questions on satellites asked in 1957 and later, for example, could not have been given from school experience by many persons who had left school before 1957. We would guess that a large part of public knowledge of science, health, and public affairs must come from the mass media or other out-of-school experience. On the other hand, when we have come upon an item that would seem to have been taught in school -- such as the fact that Lincoln was assassinated, or the name of the planet closest to the sun -- such information seemed more closely related to education than to anything else. Inasmuch as more knowledge and more use of media, particularly the print media, both go with more education, we have a tight relationship in which education affects later use of media, and use of media affects levels of information.

One of the interesting findings of this study is that use of the different media is related in different ways to these three areas of knowledge. In the case of science, and less dramatically so in the case of health, heavy use of and major dependence on the print media are closely related to more knowledge. This is easy to understand, because the print media tend to cover these subjects in greater detail than does television. The women's magazines, for example, are full of articles on health. In the case of public affairs, however, dependence upon television as one's chief source of information relates much more closely than does print to the level of knowledge. We should say a word of caution here: Much of our material on public affairs knowledge comes from surveys conducted during Presidential campaign years, when television is full of dramatic political coverage -- conventions, party rallies, interviews, and the like -- and when interest in these events is at its height. If we had comparable evidence from non-campaign years, television's importance might seem to be less. But in these public affairs surveys, the higher correlation of television to public affairs knowledge is most impressive. Our evidence supports the trend of the Roper surveys which have been asking the question, "Where do you get the most of your news?" and getting a similar, increasing trend toward television.

There is a suggestion in the public affairs evidence, and more than a suggestion in the evidence on science and health, that the kind of information typically obtained from television is more likely to be related to great events, more likely to be composed of facts and feelings than of concepts and understandings, more ephemeral and time-bound, than the kind of information more typically derived from print. This may be one reason, as we have suggested, why political knowledge is more closely related to the use of television, science knowledge to the use of print.

The process of public knowledge. Let us recall here the four elements which we listed in Chapter I as probable components of the public information process. These were the nature of the knowledge itself (recognition knowledge is much more widely dispersed than concept or process knowledge); the parade of events through the mass media (which obviously has something to do with what information is stored by media audiences); the perceived usefulness and pertinence of different kinds of knowledge; and the characteristics of the people who seek and possess the knowledge. Most of our evidence relates to this last element, and we have therefore worked mostly with "people variables.'

At this time also we should recall the findings of Chapter IV: that there are many variables related to level of knowledge, but a very few of these will give us almost as reliable a prediction as the entire list we have available. It is not surprising that we should find many characteristics of people related to knowledge levels. We are dealing with whole men, not with statistically abstracted beings, and all of us have a certain consistency in life style. The rather more surprising thing is that a very few of these characteristics -- no more than three in each case -- will give us a very good prediction. And when we find that two of these three, in every case, are education and media use, then we feel some confidence that we may be able to find a consistent pattern by which to describe the process of building public knowledge.

Let us not forget that we are dealing in this book with correlational data only. We have no experimental designs, and are therefore unable to draw any very reliable conclusions about causation. We know that education and media use, and income and media use, are closely related, for example, but we have no hard evidence -- although we are entitled to make educated guesses -- as to the pattern of causal relationship.

Granted, then, that we cannot with the evidence available prove we are right, what seems to be the pattern that would most closely fit the evidence we have?

The pattern we suggested in Chapter II has stood up very well against the later evidence. Let us begin with the variable that we have found to be, overall, the strongest predictor of public knowledge -- education. In school we learn skills of reading and listening and information-seeking. We structure and enlarge our life spaces -- our cognitive maps -- and around this map we build interests and basic knowledge so that all through the rest of our lives we are sensitive to information that fits into the map and fills in the holes. We find that seeking information to fill in this map is rewarding, and therefore learn it as a habit. And thus, after the school years, we continue to gather information from the sources available to us.

One of the chief of these is the mass media. The amount of use we make of the mass media, the way we use them, and the medium we use most, depends in great part on the education we have had. The more education, the more use we are likely to make of the media, and the more likely we are to depend on print. We make more use of the media because we have had time in school to build a more complex map and a wider set of interests, and have developed the habit of seeking information to satisfy our interests. We make more use of print because we have learned a higher skill in reading, and have learned to look for the more abstract and conceptual material more easily found in print.

So both education and media use (as well as personal communication, adult education, and other non-school sources) enter into determining the amount of information we have. But these operate within a certain situation, and consequently some situational variables enter into the process of seeking and storing information. One of these variables is the availability of information sources. We have seen that income makes a difference in science knowledge, and can suppose that this means some people are better able than others to buy science materials, and also (because income relates closely to occupation) people with higher income probably work in situations where scientific information is closer at hand and more valued. Roles make a difference. We have seen how the sex role in our society determines that women, rather than men, shall be the chief seekers after health information, and men the chief seekers of political information. Involvement and interest make a difference. We have seen that men who are active in politics and deeply interested in a campaign tend to know more about public affairs than do others who are less involved and less interested.

It is most interesting that these situational variables (except role) should be most effective with the lower educational groups. When a person has gone as far as high school graduation he is apparently locked into a pattern of information-seeking that prevails throughout the rest of his life. When he has had less than that amount of education, he has built the habit less strongly and learned the skills less well, and in this case his income, occupation, and his cultural surroundings will make a great difference in what he knows.

Education, then, looks to us like the chief causal variable as well as the chief correlational variable. It obviously influences other variables. It interacts strongly with media use, and media use with other variables in man's experience. And throughout our experience run elements over which we have no control, such as the parade of great events which we will see or hear or read about, and the coverage of these events and their background in the media.

If this is an approximation to the true pattern by which public information comes to be what it is, what would we do if we wanted to raise the level of public knowledge in such areas as those we have dealt with in this monograph? There are three ways to proceed. We could raise the level of education, or make it more efficient in implanting the skills and interest that will lead to later information-seeking in the areas where we are trying to build knowledge. We could try to get more material, and more interesting material (psychologically close to the audience) into the media; and if we knew more about other non-school sources, we could perhaps go about trying to make them better carriers of the desired information also. And finally, we could try to make information sources more readily available and easier to use, and endeavor to build up in communities the incentive and practice of seeking and exchanging information.

The most common practice in trying to build public knowledge of science, health, and public affairs, has been to do the second of these: Get more, and more interesting, material on the desired subject into the media. As we learn in greater detail about how different kinds of people look to different sources for different kinds of information, we shall be able to do this more efficiently. But we should not neglect the other two possibilities. It is somewhat surprising that we have not given more attention to reviewing the effect of different school experiences on post-school information-seeking in some of the fields where current information will be most necessary. And the example of political parties during campaigns, with rallies and personal visits, local events, parades and meetings, shows us that something can be done, even over the short term, to build a situation in which people are more likely to seek the information we would like them to know.

APPENDIX

The following questions comprise the complete collection with responses used for analysis in this volume. Questions are divided according to subject area and are in chronological order. Where appropriate, answers other than the correct one have been included. The percentage figures represent the proportion of a national sample (usually 1000 or more) with the answer shown.

PUBLIC AFFAIRS
(DOMESTIC)

Can you tell me who __________ is or what he does? (NORC, 1944)

Norman Thomas	49%
Henry Wallace	76%
John Bricker	73%
Sidney Hillman	46%
Harry Truman	67%

Do you happen to know the names of the two United States Senators from this state? (AIPO, 1945)

Could name both	35%

How many Senators are there in Washington from your state? (AIPO, 19[illegible]).

Correct	55%

What do you know about the Bill of Rights? Do you know anything it says? (NORC, 1945)

Correct	21%

Do you happen to know what a tariff is? What is it? (NORC, 1946)

Correct	46%

From what you've heard, what kind of effect do you think a high American tax on foreign goods would have on our trade? (NORC, 1946)

Correct	51%

Look over this list of names and tell me who each one is or what he does. (AIPO, 1947)

Truman	98%
MacArthur	97%
Eisenhower	95%
Dewey	91%
Taft	82%
Marshall	79%
Wallace	75%
Vandenberg	65%
Byrnes	58%
Pepper	58%
Forrestal	53%
Barkley	51%
Stassen	50%
Warren	41%
Martin	33%
Byrd	32%

Can you remember offhand the name of the United States Congressman from your district? (AIPO, 1947)

Correct	38%

What is your understanding of what the Wagner Labor Act provides -- or is supposed to do? (AIPO, 1947)

Correct	19%

Will you tell me what is meant by the term portal-to-portal pay? (AIPO, 1947)

Correct	41%

What does the term "jurisdictional strike" mean to you? (AIPO, 1947)

Correct	12%

When you read about a business recession, what does that mean to you? (AIPO, 1947)

Correct	52%

If anything should happen to President Truman, do you know who would become President? (AIPO, 1947)

Correct	(March 16)	46%
"	(August 29)	22%

Will you tell me what the term "veto" means to you? For example, what does it mean when the President vetoes a bill sent him by Congress? (AIPO, 1947)

Correct	80%

Asked of the 80% of the sample who understood what the term "veto" meant: If the President vetoes a bill, can Congress override his veto?

Correct	70%

Asked of the 70% of the sample who knew that Congress could override a veto: How much of a majority is required for the Senate and House to override a Presidential veto?

Correct	44%

Can you tell me what the term "filibuster" in Congress means to you? (AIPO, 1947)

Correct	48%

Here are some photographs of important men. Will you please look at the photographs and tell me their names? (AIPO, 1948)

Truman	93%
Dewey	84%
Eisenhower	83%
MacArthur	76%
Wallace	62%
Taft	40%
Farley	31%
Vandenberg	27%
Stassen	26%
Warren	12%
Martin	11%
Pepper	5%

Will you tell me the names of the Presidential and Vice-Presidential candidates for the: (AIPO, 1948)

Republican Party?	
Dewey	88%
Warren	58%
Democratic Party?	
Truman	91%
Barkley	49%

States' Rights?	
Thurmond	11%
Wright	3%
Progressive Party?	
Wallace	67%
Taylor	39%
Socialist Party?	
Thomas	21%
Smith	less than .5%

Have you heard anything about the Taft-Hartley Act? (If YES) What do you think ought to be done about it? (SRC, 1948)

Have not heard about it	39%
Heard, but no opinion	20%
Heard, and stated opinion	41%

Will you please tell me the number on this map which locates each of the following states? (AIPO, 1948)

California	82%
Texas	82%
Pennsylvania	59%
New York	58%
Illinois	50%
Ohio	46%
Michigan	45%
New Jersey	45%
Massachusetts	43%
Missouri	43%

What is your understanding of the purpose of the Marshall Plan? (AIPO, 1948)

Correct	52%

Will you tell me what the term "cold war" means? (AIPO, 1948)

Correct	54%

Will you tell me what the initials F.B.I. stand for? (AIPO, 1949)

Correct	78%

Have you heard or read anything about the Herbert Hoover Commission reports? (If YES) What is your understanding, in general, of the purpose of the Hoover Commission? (AIPO, 1949, 1950, 1951)

Correct (1949)	28%
Correct (1950)	31%
Correct (1951)	24%

Just in your own words, will you tell me what a "monopoly" is? (AIPO, 1949)

Correct 69%

Will you tell me what your understanding is of the term "wire-tapping"? (AIPO, 1949)

Correct 67%

Can you tell me what the term "filibuster" in Congress means to you? (AIPO, 1949)

Correct 54%

There has been some talk lately about the "welfare state." What does the expression "welfare state" mean or refer to, as you understand it? (AIPO, 1949)

Correct 36%

Will you tell me who Dean Acheson is? (AIPO, 1950)

Correct 66%

What is meant by the electoral college? (AIPO, 1950, 1951, 1954, 1955)

Correct (1950)	34%
Correct (1951)	35%
Correct (1954)	36%
Correct (1955)	35%

Have you heard or read anything about President Truman's Point Four Program? (If YES) What would you say is the main purpose of this program? (NORC, 1950)

Correct 5%

Have you heard or read anything at all about President Truman's Point Four Program? (AIPO, 1950)

Had heard or read something 27%

Asked of the 27% who had heard or read: Will you tell me something about the purposes of the Point Four Program?

Don't know 85%

When you hear or read about the term "bipartisan foreign policy," what does that mean to you? (AIPO, 1950)

Correct	26%

Will you tell me offhand what the Marshall Plan is? (AIPO, 1950)

Correct (April 28)	70%
Correct (May 26)	63%

Will you tell me what the term "cold war" means? (AIPO, 1950)

Correct	58%

Have you ever heard of George Marshall? (AIPO, 1951)

Yes	79%

Do you happen to know the names of the two U.S. Senators from this state? What are they? (AIPO, 1951)

Don't know	46%
At least one	53%
Incorrect	1%

Will you tell me what the Reconstruction Finance Corporation (RFC) is or does? (AIPO, 1951)

Correct	42%

The Russian economic system is called communism. The British economic system is called socialism. Will you tell me what the American economic, or business, system is called? (AIPO, 1951)

Capitalism, free enterprise	33%
Democracy, liberty	19%

Suppose a young person, just turned 21, asked you what the Republican (Democratic) Party stands for today -- what would you tell him? (AIPO, 1951)

Republican - some answer	38%
Democratic - some answer	32%

Have you heard of the Voice of America? (AIPO, 1951)

Yes	46%

Just in your own words, when someone mentions the term "foreign policy," what does that mean to you? (AIPO, 1951)

Acceptable answer	60%

Will you tell me what the term "cold war" means? (AIPO, 1951)

Correct	55%

Who do you plan to vote for as United States Senator? (SRC, 1952)

Named a correct candidate	32%
Named party	17%
Didn't know	41%
No answer or incorrect candidate	10%

Can you recall, offhand, the name of the Republican (Democratic) candidate for Vice President (AIPO, 1952)

Republican (Nixon)	45%
Democratic (Sparkman)	32%

Here is a list of people in the news. Will you tell me who each one is -- or what he does? (AIPO, 1952)

Eisenhower	83%
Taft	74%
Kefauver	67%
Warren	65%
Stassen	46%
Stevenson	34%
Russell	30%
Harriman	25%
Kerr	25%

Will you tell me who Adlai Stevenson is? (AIPO, 1952)

Correct	33%

Will you tell me who Estes Kefauver is? (AIPO, 1952)

Correct	59%

Will you tell me who the Vice President of the United States is? (AIPO, 1952)

Barkley	69%

How many Senators are there from each state? (AIPO, 1952)

Correct 64%

Have you heard anything about the Taft-Hartley Law? (SRC, 1952)

Yes 72%

For how many years is a President of the United States elected -- that is, how many years are there in one term of office? (AIPO, 1952)

Correct 93%

Will each of the 48 states elect members of the House of Representatives this fall, or not? (AIPO, 1952)

Correct 37%

Will you tell me what the initials G.O.P. stand for? (AIPO, 1952)

Correct 47%

What is a political party platform? (AIPO, 1952

Correct 71%

Will you tell me what the three branches of the government are called? (AIPO, 1952)

Correct 19%

Have you ever heard or read anything about the United Service Organization, or U.S.O.? (AIPO, 1953)

Yes 78%

Is it your understanding that the U.S.O. is active now?

Yes 70%

What is meant by the term "tariff"? (AIPO, 1953)

Correct 63%

What is meant by the term "farm price supports"? (AIPO, 1953)

Correct (February) 59%

What are the main arguments in favor of farm price supports?

Correct 77%

What are the main arguments against farm price supports?

Correct 72%

Just in your own words, will you tell me what is meant by the term "farm price supports"? (AIPO, 1953)

Correct (March) 54%

Can you recall the names of your Senators? (AIPO, 1954)

At least one 31%

How many U.S. Senators are there from your state? (AIPO, 1954)

Correct 49%

There is a good deal of discussion these days about Congressional committees investigating communism. Do you happen to know the names of any of the Senators and Congressmen who have been taking a leading part in these investigations of communism? (Stouffer, 1954)

Named McCarthy 70%

Do you happen to remember how the Rosenbergs were caught? (Stouffer, 1954)

Correct 28%

As far as you know, did a Congressional committee investigating communism help catch Alger Hiss? (Stouffer, 1954)

Correct 25%

Do you happen to remember how Alger Hiss was caught? (Stouffer, 1954)

Named Congressional committee 21%

What did the 18th Amendment provide? (Minnesota, 1954)

Correct 36%

How many states will elect members of the U.S. House of Representatives this fall? (AIPO, 1954)

Correct 11%

What are the first 10 amendments in the Constitution called? (AIPO, 1954)

Correct	33%

What are the three branches of the Federal Government called? (AIPO, 1954)

Correct	19%

We hear talk from time to time about plans to "re-apportion" or to "re-district" the state of Minnesota. What is meant by reapportionment, as you understand it? (Minnesota, 1954)

Correct	32%

Have you ever heard or read anything about the Bricker Amendment? (If YES) Just in your own words, what is the purpose of the Bricker Amendment? (AIPO, 1954)

Correct	13%

Here are some photographs of men in the news. Will you please look at them and tell me their names? (AIPO, 1956)

Stevenson	76%
Kefauver	60%
Harriman	25%
Symington	13%
Lausche	13%
Johnson	8%

Will you tell me who each of these men is -- or what he does? (AIPO, 1956)

Stevenson	83%
Kefauver	83%
Harriman	51%
Johnson	32%
Symington	31%
Lausche	25%

Will you tell me who George M. Humphrey and Christian A. Herter are? (AIPO, 1956)

Humphrey	28%
Herter	10%

Will you tell me what the term "filibuster" means to you? (AIPO, 1956)

Correct	48%

On the question of the government in Washington giving money to cities and towns around the country if they need help to build more schools, is the government going too far, doing less than it should, or what? (SRC, 1956)

Some opinion	72%
Didn't know or hadn't heard what the government was doing	28%

On the question of the United States giving economic help to the poorer countries of the world even though they can't pay for it, is the government going too far, doing less than it should, or what? (SRC, 1956)

Some opinion	67%
DK or not heard	33%

On the question of the government helping people get doctors and hospital care at low cost, is the government going too far, doing less than it should, or what? (SRC, 1956)

Some opinion	59%
DK or not heard	41%

On the question of the government seeing to it that Negroes get fair treatment in jobs and housing, is the government in Washington going too far, doing less than it should, or what? (SRC, 1956)

Some opinion	67%
DK or not heard	33%

On the question of cutting taxes, is the government in Washington going too far, doing less than it should, or doing just about right? (SRC, 1956)

Some opinion	63%
DK or not heard	37%

On the question of the government seeing to it that everybody who wants to work can find a job, is the government going too far, doing less than it should, or what? (SRC, 1956)

Some opinion	67%
DK or not heard	33%

Will you tell me who each of these men is -- that is, what he does? (AIPO, 1957)

Faubus	57%
Gary	3%
Coleman	3%

Identify these labor leaders: (AIPO, 1957)

John L. Lewis	93%
Dave Beck	80%
Walter Reuther	70%
Harry Bridges	66%
George Meany	50%
David McDonald	25%

Can you name the Senators from this State? (AIPO, 1957)

At least one	35%

Do you happen to know the name of the Congressman from your district? (AIPO, 1957)

Correct	22%

When you hear or read about the Fifth Amendment, what does it mean to you? (AIPO, 1957)

Correct	42%

Who would you have voted for for Congress if you had voted? (SRC, 1958)

Correct candidate name	14%
Party only	55%

The election for United States Senator, who did you vote for? (SRC, 1960)

Named correct candidate	52%
Named party only	42%

The vote for Congressman . . . who did you vote for? (SRC, 1960)

Named correct candidate	48%
Named party only	49%

Vice President Nixon . . . Do you happen to know what part of the country he comes from? (SRC, 1960)

Correct	54%

About how old would you say Nixon is? (SRC, 1960)

Roughly correct	73%

Could you name three leaders of the Republican Party? Could you name three leaders of the Democratic Party? (Almond-Verba, 1960)

Six correct	36%
Five "	17%
Four "	11%
Three "	8%
Two "	6%
One "	4%
None "	16%

Do you happen to know what Kennedy's religion is? (SRC, 1960)

Correct	90%

Do you happen to know which party had the most Congressmen in Washington before the election this (or last) month? (SRC 1960, 1964)

Correct (1960)	59%
Correct (1964)	64%

Do you happen to know which party elected the most Congressmen in the election this (or last) month? (SRC, 1960, 1964)

Correct (1960)	54%
Correct (1964)	80%

When a new President comes into office, one of the first things he must do is appoint people to cabinet positions. Could you tell me what some of those cabinet positions are? Can you name any others? etc. (Almond-Verba, 1960)

Could name none	28%
one	5%
two	8%
three	12%
four	13%
five or more	34%

Will you tell me what is meant by the term "electoral college"? (AIPO, 1960)

Correct 33%

Just in your own words, what is your understanding of the Kennedy administration's plan to increase trade with other nations? (AIPO, 1962)

Acceptable answer 13%

Do you happen to remember the name(s) of the candidate(s) for Congress that ran in this district this November? (SRC, 1964)

Named and identified party of one candidate	26%
two	26%
three	.5%
four	.5%
NONE	47%

Have you heard what part of the country Senator Goldwater comes from? (SRC, 1964)

Correct 80%

Do you happen to know what Senator Goldwater's religion is? (SRC, 1964)

Correct 16%

Have you heard what part of the country President Johnson comes from? (SRC, 1964)

Correct 94%

Do you happen to know what President Johnson's religion is? (SRC, 1964)

Correct 12%

Have you heard of: (SRC, 1964)

CORE	70%
Black Muslims	81%
John Birch Society	79%
American Communist Party	80%
Americans for Democratic Action	42%

Have you heard of: (Continued) (SRC, 1964)

NAACP	88%
Ku Klux Klan	95%
Christian Anti-Communist Crusade	25%

PUBLIC AFFAIRS
(FOREIGN)

Will you please tell me the number on this map which locates each of the following countries? (AIPO, July, 1947)

England	72%
Italy	72%
France	65%
Spain	53%
Poland	41%
Holland	38%
Greece	33%
Czechoslovakia	25%
Yugoslavia	22%
Hungary	18%
Rumania	17%
Bulgaria	13%

Will you please tell me the number on this map which locates each of the following countries? (AIPO, November, 1947)

Brazil	60%
Argentina	49%
Chile	44%
Peru	21%
Bolivia	17%
Paraguay	16%
Ecuador	16%
Colombia	16%

What is meant by the veto power in the United Nations organization? (AIPO, 1947)

Correct	57%

Will you tell me who the chief delegate to the U.N. organization is from each of these countries: (AIPO, 1947)

Russia	34%
U.S.	11%
England	2%
France	.5%

Will you tell me who Russia's foreign minister is? (AIPO, 1947)

Reasonably correct	62%

Identify the Franco regime. (AIPO, 1948, May 1949, December 1949)

Correct (1948)	53%
" (May 1949)	58%
" (Dec 1949)	56%

Will you tell me what kind of government China has today? (AIPO, 1950)

Correct	62%

Name one or more powers now occupying Germany. (AIPO, 1950)

At least one	82%
All four	36%

With what country do you associate General Franco? (AIPO, 1950)

Correct	56%

Will you tell me what is meant when people refer to the 38th Parallel In Korea? (AIPO, 1951)

Roughly correct (April)	67%
" " (August)	73%

Can you tell me where Manchuria is? (AIPO, 1951)

Roughly correct	63%

Will you tell me what is meant by the term "Atlantic Pact"? (AIPO, 1951)

Correct	30%

Do you happen to know where Iran is? (AIPO, 1951)

Correct	40%

What is your best guess as to the population of South Korea? (AIPO, 1951)

Around 20,000,000	3%

Will you tell me what the North Atlantic Treaty Organization is? (AIPO, 1951)

Correct	35%

Will you tell me where Formosa is? (AIPO, 1951)

Roughly correct	50%

Will you tell me who Chiang-Kai-shek is? (AIPO, 1951)

Correct	79%

Will you tell me who Marshall Tito is? (AIPO, 1951)

Correct	45%

Will you tell me where the Suez Canal is? (AIPO, 1952)

Correct	48%

Will you tell me who Anthony Eden is? (AIPO, 1952)

Correct	49%

Will you tell me the name of the new Secretary-General of the United Nations (Hammarskjold)? (AIPO, 1953)

Spelled name flawlessly	1%
Could recite name but could not spell it	6%
Could only partially identify	3%

Do you happen to know how far away from the Red China mainland the islands of Quemoy and Matsu are? (AIPO, 1954)

Correct	14%

As you know, Germany today is divided into two zones. Can you tell me what the zone controlled by Russia is known as? (AIPO, 1954)

Correct	54%

Will you please tell me the number on this map which locates each of the following countries? (AIPO, 1955)

England	65%
France	63%
Spain	57%
Poland	32%
Austria	19%
Yugoslavia	16%
Rumania	11%
Bulgaria	10%
Could locate none	23%

In what ocean is the island of Midway? (AIPO, 1955)

Correct	69%

Of what country is New Delhi the capital? (AIPO, 1955)

Correct	55%

Have you heard or read about the trouble in Formosa and the Formosa straits? (If YES) Do you happen to know how far away from the Red China mainland the islands of Quemoy and Matsu are? Do you happen to know which side holds the islands of Quemoy and Matsu at the present time? (AIPO, 1955)

Distance	14%
Ownership	10%

Please tell me who these people are: (AIPO, 1957)

Nehru	43%
Adenauer	31%

In your own words, can you tell me what the European Common Market is? (AIPO, 1961)

Correct	13%

SCIENCE

Identify Einstein. (AIPO, 1945)

Correct	55%

From what you have heard or read, what do you think is the main purpose for the atom bomb tests which are to be held in the Pacific? (AIPO, 1946)

Mentions "see what it will do" purposes:	69%

As far as you know, is the U.S. trying to get other countries to agree to the international control of atomic energy, or not? (NORC, 1947)

Yes	56%

Have you heard or read anything about the official American plan for international control of atomic energy -- often called the Baruch Plan? (If YES) Do you feel you have a fairly clear idea of the plan? (NORC, 1948)

Correct 15%

As far as you know, has the United States been sharing any of our information on atomic energy with England and Canada since the war? (NORC, 1949)

Yes 23%

Have you heard or read anything about the new H-bomb? (If YES) Will you tell me what you do know about this bomb? (AIPO, 1950)

Heard, with information 48%

Have you heard or read anything about the new hydrogen bomb? (If YES) Will you tell me what you do know about this new bomb? (AIPO, 1950)

Heard, with information 52%

Who was Gutenberg? (AIPO, 1952)

Correct 23%

Who was Freud? (AIPO, 1952)

Correct 21%

What mineral, or metal, is important in the making of the atom bomb? (AIPO, 1952)

Correct 60%

Do you happen to know who J. Robert Oppenheimer is? (Minnesota, 1954)

Correct 44%

U-235 was the name of a famous German submarine during World War II. Would you say that's true or false? (Minnesota, 1954)

True 27%
False 37%

Would you tell me what is meant by the "fallout" of an H-bomb? (AIPO, 1955)

Correct 17%

What is the largest bird in the world? (AIPO, 1955)

Correct 26%

What great scientist who died recently do you associate with the theory of relativity? (AIPO, 1955)

Correct 63%

Who invented the telephone? (AIPO, 1955)

Correct 76%

Which planet is nearest the sun? (AIPO, 1955)

Correct 7%

Do you know of any uses of atomic energy except for war purposes? (AIPO, 1956)

Medicine or other purposes mentioned 49%

Just for fun, about how far from the earth would you guess the moon is? (Minnesota, 1957)

Correct 4%

Have you ever heard of radioactive fallout or dust from an atomic bomb? (If YES) As you understand it, what is radioactivity like? (SRC, 1957)

Vague or heard without details	36%
Nontechnical information	21%
Technical information	7%
Misinformation	33%
Never heard	2%

Compared with the earth, about how big would you say the moon is -- much larger? about the same size? or much smaller? (Minnesota, 1957)

Much smaller 38%

Have you heard anything about launching a space satellite, sometimes called a man-made moon? (If YES) From what you've heard, what is the purpose of launching these space satellites? (SRC, 1957, 1958)

	(1957)	(1958)
Scientific information	21%	22%
Russian competition, future possibilities	0	42%
Heard without knowledge, vague	14%	23%
Misinformation	11%	4%
Not heard	54%	8%

When you read or hear about "fallout," what does this term mean to you? (AIPO, 1961)

Correct	57%

[Note: the following questions are paraphrased from a 1966 CBS telecast called the National Science Test.]

Does adding salt raise the temperature at which water will boil?

Yes	42%
No	56%
NA	2%

Does cutting up potatoes make them cook faster?

Yes	92%
No	7%
NA	1%

Does an opened refrigerator cool the kitchen?

Yes	25%
No	74%
NA	1%

Can bananas be prevented from getting overripe too fast by refrigeration?

Yes	47%
No	52%
NA	1%

Will water spill over a glass when ice in the water melts?

Yes	44%
No	56%

The oceans are the major source of rainwater.

True	64%
False	35%
NA	1%

You see lightning before hearing thunder because the sound has to travel farther.

True	65%
False	34%
NA	1%

After 20 years, initials carved on a tree will be higher off the ground.

True	51%
False	48%
NA	1%

Birds sing mainly to summon other birds.

True	55%
False	45%

At daybreak, the sun is visible before it comes over the horizon.

True	55%
False	44%
NA	1%

If you push a child on a swing, does a big or a little push make any difference in the number of swings back and forth?

Big push, more swings	62%
Little push, more swings	10%
No difference	29%

To balance a seesaw, the heavier child should move toward the center.

True	87%
False	11%
NA	2%

The main force moving the child down a slide is the push he has received.

True	35%
False	64%

Human muscles act on the skeleton by: pushing, pulling, both?

Pushing	4%
Pulling	9%
Both	86%

Identical twins result from fertilization of a single egg cell.

True	76%
False	22%
NA	1%

The picture on TV is made by a beam of light projected from inside the picture tube.

True	71%
False	28%

The air pressure at the top of the wing of an airplane in flight is equal to the pressure at the bottom.

True	36%
False	63%
NA	1%

A rocket is lifted off the pad by the force of the exhaust gases pushing down.

True	75%
False	25%

Gravity's pull keeps a rocket in orbit.

True	58%
False	42%

An astronaut in orbit has no weight.

True	81%
False	20%

An astronaut on the moon will weigh more.

True	25%
False	74%
NA	1%

Spacecraft on the moon will need a protective heat shield to land.

True	61%
False	38%
NA	1%

Has science developed an equivalent to a ray gun?

Yes	71%
No	29%

Has science developed an equivalent to a time machine?

Yes	18%
No	81%
NA	1%

Has science developed a machine that thinks for itself?

Yes	41%
No	58%
NA	1%

Has science succeeded in developing a living organism?

Yes	44%
No	55%
NA	1%

HEALTH

Can you explain the difference between a vitamin and a calorie? (AIPO, 1941)

Correct difference: 11%

Can any possible harm result from drinking milk that is not pasteurized (raw milk)? (AIPO, 1944)

Yes	64%

Do you think a person can be born with tuberculosis? (AIPO, 1947)

No (most correct response) 30%

Would you say it is possible to catch tuberculosis from someone else? (AIPO, 1947)

Yes	79%

Is it your understanding that people over 40 can get tuberculosis? (AIPO, 1947)

Yes	74%

Do you happen to know whether tuberculosis is caused by a germ? (AIPO, 1947)

Yes (most correct response)	63%

Will you tell me what disease causes the greatest number of deaths in this country today? (AIPO, 1948)

Heart disease	50%

Do you happen to know of any medicine that is made from the organs or tissues of animals? (NORC, 1948)

Could name at least one	33%

Do you think cancer is curable? (AIPO, 1950)

Yes	34%
No	20%
DK	14%
Qualified Yes	32%

Do you think cancer is contagious (catching)? (AIPO, 1950)

Yes	12%
No (most correct)	70%
No one knows	8%
DK	11%

Would you guess that more people are in hospitals for physical or mental illness? (BASR, 1954)

Physical	53%
Mental	37%

Have you heard of three diseases (multiple sclerosis, muscular dystrophy, cerebral palsy)? (BASR, 1954)

Yes	81%

When a person gets diabetes, can he tell something is the matter with him by the way he feels, or might he not know it for some time? (NORC, 1955)

He can tell	22%
He might not know	55%
DK	23%

Do you happen to know any of the signs or symptoms of diabetes? (NORC, 1955)

Four or more	6%
Three	9%
Two	15%
One	18%
NONE	52%

When a person gets cancer, can he tell something is the matter with him by the way he feels, or might he not know it for some time? (NORC, 1955)

He can tell	12%
He might not know	81%
DK	7%

Do you happen to know any of the signs or symptoms of cancer? (NORC, 1955)

Four or more	8%
Three	14%
Two	21%
One	19%
Incorrect only	6%
NONE	32%

Do you think it is possible or not possible to catch cancer from someone else? (NORC, 1955)

Not possible	75%

When a person gets polio, can he tell something is the matter with him by the way he feels, or might he not know it for some time? (NORC, 1955)

He can tell	58%
He might not know	29%
DK	13%

What are the signs or symptoms of polio? (NORC, 1955)

Four or more	17%
Three	20%
Two	19%
One	13%
NONE	31%

What doctor discovered the anti-polio vaccine? (AIPO, 1955)

Salk	80%

Do you think it is possible or not possible to catch polio from someone else? (NORC, 1955)

Possible	62%

How much progress would you say has been made in overcoming each of the following diseases? (AIPO, 1956)

Smallpox (practically wiped out)	73%
Common cold (little progress)	50%
Diphtheria (practically wiped out)	50%
Tuberculosis (much progress)	74%

Do you recall hearing anything about the vaccine for preventing polio? (If YES) What was it that you heard? (SRC, 1957)

Heard, no details or general information	53%
Specific information	40%
Misinformation	2%
Not heard	4%

Have you heard about fluorides being added to drinking water? (If YES) What is the purpose? (SRC, 1957)

Specific decay information	40%
Vague, without decay information	11%
Heard without details	8%
Misinformation	15%
Never heard	26%

Do you happen to know any of the symptoms of Asian flu? (AIPO, 1957)

One or more symptoms	35%

Do you know if there is a vaccine to protect against Asian flu or not? (AIPO, 1957)

Yes	76%

Ever hear of pills called tranquilizers? (AIPO, 1957)

Yes	48%

What are the signs or symptoms of tuberculosis? (NORC, 1958)

Three or more	24%
Two	27%
One	23%
NONE	26%

What are the signs or symptoms of diabetes? (NORC, 1958)

Three or more	16%
Two	17%
One	17%
NONE	50%

What are the signs or symptoms of polio? (NORC, 1958)

Three or more	35%
Two	23%
One	13%
NONE	29%

When a person gets ____________, he can tell something is the matter with him. (NORC, 1958)

Arthritis	83%
Asthma	77%
Polio	60%
Heart trouble	35%
Liver trouble	33%
Diabetes	19%
Tuberculosis	18%
Cancer	11%

[Response represents proportion who felt immediate recognition of disease was possible.]

Which of these conditions do you think a person should see a doctor about right away? (NORC, 1958)

Coughing 5-6 days	65%
Diarrhea/constipation several days	61%
Tired all the time	76%
Frequent headaches	81%
Lump, discolored skin patches	95%
Shortness of breath	80%
Sore throat	27%
Unexpected loss of 10 lbs.	80%
Thirsty all the time	62%
Pains in the chest	90%
Pains in the stomach	80%

Do you happen to know what pyorrhea is? (NORC, 1959)

Correct	80%

Is pyorrhea curable? (NORC, 1959)

Yes	71%

Have you heard about the Medicare Plan proposed by the Kennedy Administration? (AIPO, 1962)

Yes	82%

If (YES) Who would be covered by this plan?

Correct	10%